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ORIGINAL ARTICLES

ORTHODONTIA IN THE YEAR NINETEEN HUNDRED EIGHTEEN*

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I BELIEVE it may not be time misspent to consider for a few minutes, some of the beginnings of our work as a specialty. One does not need to assemble a thousand instances of the sometime efficient, and more often crude methods resorted to for the correction of malocclusion of the teeth, even so recently as to be quite within the recollection of those present. A bird's-eye glimpse over that long period will at least cause anyone to reach the conclusion that chaos reigned. But out of it all there was to spring better things. Indeed that era furnished the soil from which grew a fairer flower than had blossomed before.

Until Angle observed, thought, practiced and finally furnished a simple classification of malocclusion of the teeth, certainly little progress had been made in making of orthodontia either an art or a science. We know science is concisely defined as "systematized knowledge." Certainly there was not an abundance of "systematized knowledge" as applying to our work prior to Dr. Angle's teachings. If it is complained his work did not constitute of orthodontia a science, in the strictest sense of the word, I reply that in the affairs of mankind there is little that can be wholly scientific in the sense, for instance, that mathematics is a science. There we have absolute knowledge, systematized, exact, and unvarying from a perfect principle.

Again Dr. Angle simplified and correlated appliances for bringing about the correction of malocclusion of the teeth. Whatever the objections to his earlier appliances, it is to be remembered that until he taught classification and the use of the expansion arch in the work of correction, orthodontia received little impetus. Only at that time did it commence to take its place seriously as a real department of dentistry.

*Read before the Pacific Coast Society of Orthodontists, San Francisco, Calif., Feb. 18 and 19, 1918.

Every progressive man avails himself of the thought and work of others, perchance contributing something of his own that may be original. But credit is always due the man who best sifts the wheat from the chaff, utilizing what is worthy to the upbuilding of a method or a science that shall bring a vast amount of good to the world. And lest it be carelessly said that Dr. Angle was content in the conceit that his earlier appliances were beyond improvement, it is recalled he has incessantly labored for their betterment, indeed to the point of adopting those which contemplate entirely different principles of tooth movement. A sane tolerance would grant to any man, whether he be of one school or of another, the credit due him because of his own well-wrought work. Every time-tested improvement of classification, or advancement in mechanical procedure, should be allowed to fall into its proper channel and receive its due recognition. But the test of time does not always fulfil the *encomiums* of the moment! Witness some of the impossible mechanical contrivances being offered for orthodontic treatment even today.

Before the era of specialization, the use of jackscrews, rubber plates and mechanism most intricate and uncertain in its working, held sway. Under the new regime, simplification and standardization of methods have been sought and attained in a measure not secured heretofore.

It is true not all men of recognized ability in the practice of orthodontia choose to accept and make use of some of the newer appliances, in the belief they may do better with the older ones, or with modifications of them. However, new standards have been set, higher principles defined, and those with the intelligence, the will and the requisite skill, need not go far astray in their efforts at the successful correction of malocclusion of the teeth today.

There have come to the attention of orthodontists within the past couple of years, certain mechanical methods for the determination of the normal dental arch. These methods have elicited some attention among our coworkers in the eastern part of the country. While I believe the science of mathematics may be an aid in the formulation of a principle from which to work, I would not think mechanical engineering plots or surveys as employed in the methods cited, would be a safe and unvarying guide in orthodontia. We are not dealing with blocks of wood or stone, the harmonious relation and placement of which depend upon the gauge and compass. We are concerned with vital tissues,—parts of human beings,—with the teeth and their investing structures. Insofar as a hard and fast mathematical formula may direct the orthodontist to a general principle of procedure, just so far and no farther may these methods be valuable.

In the saying of it I may lay myself liable to a bit of ridicule, but I would be interested to know how many specialists in orthodontia share my opinion, in part or in whole? I have the belief, with the knowledge of malocclusion I possess in common with many other men, and the experience I have in its correction,—that my own sense of proportions and of the harmonious relation of the teeth, of the dental arches and of the human face,—constitute a guide maybe as trustworthy as that which may be formulated through mechanical diagrams of the kind mentioned.

What of art as related to orthodontia? Certainly the best teaching in

orthodontia, can not ignore art as an essential. Does the artist depict on canvas his wonderful conceptions of the human form—so ideally beautiful in every harmonious line, because of his resort to mechanical engineering? Did Michelangelo and Leonardo da Vinci chisel and paint their way to undying fame because of the aid of mechanical formula? I think not. Neither do I believe the successful practice of orthodontia to be specifically dependent on such devices. A knowledge of architecture and mathematics may have contributed to the splendid sense of harmony and of proportion these eminent men possessed. A similar knowledge might aid the orthodontist in the same way.

Again, I do not believe I am alone in my personal experience when it comes to a resume of my work through a good number of years. As I look over the cases it has been my pleasure to treat, I have observed and heard of few, if any, absolute failures, and certainly there have been many tolerably good results. There have been few displeased parents or guardians, I think. My successes have come through an unceasing persistence of effort, and the failures, in whatever degree, have largely resulted because of contingencies which no amount of mathematical formula would have overcome. I refer to mouth-breathing, lip and tongue habits, maturity of the patient treated, etc. Outside these cases there may have been a few where I have failed to meet the occasion through personal inability. But frankly, I feel their number has been tolerably small. I make this rather personal statement for the purpose of illustrating what I feel to be a truth that is too much overlooked; namely, *There is no Royal Road to Success in the Practice of Orthodontia!* There probably never will be, in the common meaning of that expression. Only through conscientious, intelligent effort, and love for our work, can we obtain really good results. The tissues with which we deal, and the forces which resist our efforts, are a part of the complex life problem itself, and as such their treatment is not subject to the rigidly exact methods of the mathematician.

I note an impatience at waiting for results. The wearing of appliances through long periods of time *is* a bit deplorable, but we may not hope to accomplish in three months time what nature would require three years to do! Undue haste augurs an unhappy result of efforts expended.

But to revert to the subject of the preceding paragraph,—it lessens our weariness if we can bring ourselves to a realization that true progress does not come through an uninterrupted series of successes. Today the attention is focused on some wonder-working appliance, method or theory, which promises to revolutionize our practice. It is adhered to more or less tenaciously, sometimes dependent a bit upon the persistence of its originator or chief advocate. In due course it may be wholly discarded or superseded by something else. Or, perchance, it may be adopted in part. But out of all this most interesting zigzagging, a scientific standard or method is more nearly approached, maybe, than ever before. Who then shall say, when viewing the matter in this broader way, that any really conscientious effort is really wholly wasted?

I have not failed to note in the record of a recent meeting of orthodontists, the president of the society stated it took him ten years to unlearn what he learned in six weeks,—referring to certain teachings he had received in his specialty. His statement was sufficiently amusing (for whatever reason) to

produce laughter in his audience. His admission presupposes an unusual susceptibility to the instructions of his teacher. I am very positive his instructor has all too often regretted he wasted any time with a student, who has felt himself so handicapped as a result of receiving the best teaching in orthodontia the world afforded at the time. It is worthy of note he stands quite alone in his estimate of the instructions to which he refers.

The question of orthodontia schools has been receiving no small amount of comment, both before societies and among specialists as they meet from time to time in social diversion. I wish here to record my great gratitude for the teachings I received in the Angle School of Orthodontia. I think I have observed about as closely as anyone the status of other courses in our specialty, and I have yet to know of a student of these more recently established schools who I believe has received benefits equaling those received by the majority of the students of the Angle School of Orthodontia. It is admitted, as a matter of common reason, that any course of instruction given today might have the advantage of the progress of the past few years, much of which progress is again traceable to Angle's work since the closing of his school.

Apropos of the last view expressed, some of the greatest institutions of learning in the world today, existed and taught theories, methods and practices years ago which might appear ludicrous today. Still those institutions have the respect of mankind and the love of their alumni. They are ever alert to present the best courses of instruction the times produce.

So I feel that nothing short of pure personal animus, having its roots in some unfortunate differences of opinion or temperamental considerations, could cause any man to make statements such as were made at the meeting of orthodontists I have referred to. Not only are such statements in extremely bad taste, as directed against the first president of the society where they were expressed, but in a way they impugn the standing of many of the leaders in the practice of orthodontia in the world today. I am sure I will be supported very generally in the opinion that such remarks rebound to their author's own disparagement.

But I am sure there is no need for discouragement. Our work is advancing,—if not always in a straight line, then by the zigzag course I have alluded to. Little more may be said of any other scientific endeavor. Perfection is so high an attainment that we may scarcely hope for more than a little nearer approach to it as the years go by, and then only through the best efforts of all striving toward the one common goal.

DISCUSSION

Dr. Wm. Cavanagh.—Certain great things have been accomplished in orthodontia, and many must have contributed to our present sum-total of knowledge. There have been certain leaders who have been recognized, and certain basic principles have been laid down in our practice which can never be disputed. Time has gone on, and they have been proved. We must admire and must honor those minds which have made our present position as a specialty possible. We should overlook personal matters. All great men have certain characteristics we can admire. I will ask this society to forget personal jealousies and remember the contributions of one prominent orthodontist, and recognize in him the mind of a master. I refer to Dr. Angle. I think no man has ever accomplishehd so much as he in the systematizing and elucidation of the basic principles on which our work is founded. We

should recognize the fact that Dr. Angle today takes much the same position in orthodontia that Dr. G. V. Black occupied in general dental practice, and which the Mayo brothers occupy in surgery. He has been the leader, and has placed the specialty of orthodontia on a sound basis.

Dr. James D. McCoy.—Mr. President and Members: A good many points have been covered in Dr. Gray's paper which we could perhaps discuss at length with profit. I have been particularly interested in all his remarks, because he has expressed (if I may state it in that way) my own sentiments very, very thoroughly, and has done so in much more beautiful language than I might have used.

I am interested in his reference to the survey of the dental arches, because this subject has occupied more or less of the attention of orthodontists during the past year. I believe Dr. Gray has summed up the situation in a very logical way in his remarks.

Following the last meeting of the American Society of Orthodontists I was interested in reading in a report of the meeting, the remarks of the president of the society, which Dr. Gray has quoted. I am sure my opinion of the statement made by Dr. Federspiel would not look at all well in print.

I believe all the great principles we use in our specialty were originated by Dr. Angle. At least he has placed them before us in a manner so that we can utilize them, and I believe orthodontia has received its very greatest impetus through him and through the establishment of his school. I believe if we go back and follow out the results of that school we will find, even though we might not consider the course of instruction then given, as perfect today—we must acknowledge that Dr. Angle was able to instill a wonderful degree of enthusiasm into his students, and they still maintain that enthusiasm even years after the school has been discontinued.

I shall not attempt to discuss any of the other points touched upon by Dr. Gray. I think I have at least expressed myself rather forcibly on one feature of the paper.

Dr. John R. McCoy.—I thoroughly approve of Dr. Gray's remarks, particularly where he speaks of the honor that is due the great man that has brought order out of chaos in orthodontia.

Dr. H. L. Morehouse.—I wish to express my appreciation of Dr. Gray's most able paper. As Dr. James McCoy has said, I think he has expressed the sentiments of us all in a most comprehensive manner.

I also was glad he brought out the matter of the survey of the dental arch because, while I have not gone into it definitely, I have felt we could not treat our cases from the mathematical standpoint. We might possibly get some idea as to the size of the arch, but outside of that I have not been able to see wherein it would be of any great aid in our work.

As to the Angle School of Orthodontia, certainly I feel most of Dr. Angle's students were able to grasp the fundamental principles taught there, and that they have been able to apply them successfully is attested by the many successful specialists in orthodontia in the country today who received their first real training in his school.

I think we should strive not to be narrow, and ever be appreciative of the principles Dr. Angle taught us. These principles have proved their worth, and they can not be cast aside.

Dr. Mann.—It does not seem to me anyone who has not had the advantage of the course in the Angle School of Orthodontia, can appreciate the opportunities afforded its students for gaining an understanding of the fundamental principles upon which this science is based. In my own case, I approached the course with a great deal of misunderstanding. It had been my thought that the course of instruction would embrace very largely mechanical principles. But after eight weeks spent in that school I not only returned home with a different understanding of orthodontia, but also with a clearer and better conception of the general science of dentistry. Albeit the nomenclature of Dr. Angle is as simple as any person could devise, it embraced everything necessary to clearly signify the conditions as we find them in individuals. The knowledge of occlusion, of normality according to type as he taught it day after day, has given me personally—and I feel others, who had the advantage of the course—a clearer and better understanding of all things pertaining to the oral cavity.

Dr. Gray has read one of the ablest papers I have listened to in a long time.

Dr. Allen Suggett.—In reference to the surveying instrument of Dr. Stanton. He sent out here to the Dental Congress in 1915 a number of slides, together with his paper. The models he sent were indeed very beautiful, and we were much interested in his work. I never have made up my mind as to just what use it is going to be to orthodontia, although it seemed to me a wonderfully scientific way of determining the least movement by which

one could place the teeth in occlusion. Whether practical or not in use, I do not know, but I still feel it is very scientific and most accurate. Evidently much time and study has been given the method.

Referring to the discussion as to Dr. Angle, as time goes on I am sure the petty things that have marred the association and friendships among orthodontists will be forgotten. There is no question as to the lead Dr. Angle has taken in the specialty of orthodontia, nor as to the scientific principles he has laid down. Neither is there any question at all as to the enthusiasm with which he imbued his students and followers, and I believe it would be more their fault than his if these small things were allowed to be perpetuated. I think in all these matters (and I would include the remarks which had reference to the president of the American Society of Orthodontists) that the way to make progress is to be more gentle, more open-minded and more indulgent of the other fellow. Someone has said that to understand was not to criticise. Another said, to thoroughly understand, there was nothing to criticise. So that I think, as time goes on grievances will disappear, and it is up to all of us to endeavor to discourage them. We certainly will always remember the splendid accomplishments of Dr. Angle, and the basic principles he has advanced which have never been approached by others.

Dr. L. E. Carter.—I think Dr. Gray's paper has brought to our realization some appreciation of what specialization will do in any particular line of work. He has referred to what has been accomplished in orthodontia since Dr. Angle introduced it as a specialty. With reference to the different schools of orthodontia, I can not imagine a man's head being so hard it would take ten years to seep out of it what could be driven in in six weeks, and if it could be driven in in six weeks it is a pretty good recommendation of Dr. Angle's School.

I believe Dr. Angle's name and orthodontia will always be practically synonymous. His scientific attainments and what he has done for orthodontia should entitle him to the credit for having made the specialty what it is today.

With regard to these engineering surveys or plots of the dental arches, I think that Dr. Gray hit the nail very well on the head, and I expressed myself yesterday as to my opinion along that particular line. I may remark again that I do not believe we can treat a human being like we can a steam engine.

Dr. Scott.—Regarding Dr. Stanton and his engineering principles as applied to orthodontia. About a year ago I had the pleasure of spending all of one day with Dr. Stanton, and with his engineer, Mr. Fish. Mr. Fish is not a dentist, but is a civil engineer if I remember correctly. He takes a model of the mouth where malocclusion is present, and surveys this model scientifically and correctly. Of that there is no doubt. He plots upon tracing paper with scientific instruments the teeth in malocclusion, and then from this he measures scientifically the diameters of the teeth above the gum lines, contour of the rugæ, hard and soft palate, and plots them in occlusion. Up to that point it is all right as I see it, and I followed him as closely as I could, and as closely as my knowledge of mathematics would permit. From this point on he tells you just how far and in what direction, be it labially, buccally, mesially or distally, or in any direction, each and every tooth must be moved in order to establish the normal occlusion. As I see it, that is all right, but he does not take into consideration the median line of the face. Now you know, and we all know, that the definition of normal occlusion should be made to read something like this: Normal occlusion is the normal relation of all the inclines of the teeth, not only at rest but also in function. You may take the most beautifully occluded teeth you can imagine and they will occlude at rest, but not in function and then there is not much value to it, as they will not stay at rest.

What we are trying to do at least, is to establish a first molar index,—getting the position of the upper first molar in relation to three planes of the face. These three planes are, the plane of Frankfort, passing through the eye and ear; the median plane, passing through the nose and external occipital protuberance and the third plane, passing from ear to ear. If we can establish the relation of the upper first molar in relation to that, we would have something from which to work. The upper first molar is a very hard tooth to move distally. Perhaps someone here can tell us how to do it, but I can not do it. Dr. Stanton surveys the models, and tells you just where to move the teeth, but he does not tell you how to do it. Unless he does that, his plans are not of great value.

Dr. Gray.—I wish to thank you all for the generous discussion accorded my paper.

PRESIDENT'S ADDRESS BEFORE THE PACIFIC COAST SOCIETY OF ORTHODONTISTS*

By Wm. Cavanagh, D.D.S., Portland, Oregon

IT would seem but logical that upon the occasion of these annual meetings of our society, the trend of thougnt outlined in the presiding officer's address would be largely toward a consideration of the progress made within the profession of orthodontia during the year; and an analysis of these causes which prohibit our more rapid development. In other words, to turn the x-ray of self-inspection upon our accomplishments and limitations in the hope that it may assist us in materially increasing the former, and eliminating the latter.

In thus reviewing the cause we represent, we find much that is gratifying, but nothing to warrant us in proclaiming that we should be content with our present status.

It is highly improbable that orthodontia will ever become what is termed an exact science, inasmuch as, while man has developed certain exact sciences, none of them apply to his own being. He is too variable a quantity.

We will, however, have approached much more nearly to this ideal when the light is more fully thrown on certain obscure factors in the etiology of malocclusion, and I feel that I express quite accurately the state of mind of our profession when I assert that the next great advance within our ranks must come as a result of investigation in this field.

From our inability to differentiate between those cases which are susceptible of successful treatment, and those which are not, arise practically all of our professional woes, and to eliminate them will require a more intimate knowledge of the causes of malocclusion than we now possess.

Our failures occur, not from any deficiency in the available technical knowledge necessary to obtain normal occlusion, but rather from the lack of understanding those forces which operate to destroy the results obtained, possibly, after many months, and perhaps years, of painstaking effort.

Somewhere, I have read that orthodontia is, or should be, nine-tenths scientific and one-tenth mechanical; but it is obvious to us all, that we are developing in inverse ratio—that we are becoming top heavy with mechanical devices and systems, while much of the scientific base upon which we are supposed to have builded, is still unproved.

Of recent years, we have had wrought out, and placed at our disposal by the master minds of our profession, certain highly efficient and refined appliances, by means of which any competent orthodontist is capable of producing normal occlusion of the teeth, where such occur in normal number and size.

With retaining devices, we are sufficiently familiar to maintain normal occlusion so long as we depend upon that mechanism. But who among us does not remove such retaining appliances from certain of his patients in fear and trembling that he may possibly be furnishing the teeth, so released, a return ticket,—and why?

*Read before the Pacific Coast Society of Orthodontists, San Francisco, Calif., February 18-19, 1918.

Because the science of orthodontia, and by that I mean its etiology, and especially the constitutional, congenital, and hereditary factors of malocclusion, are not fully understood.

It is true we can be reasonably positive regarding our statements as to the effects of abnormal breathing, of caries of the deciduous teeth, of retarded absorption of the roots of such teeth, of faulty dental restorations, and all similar local conditions; but it is not these which cause the necessity for the replacement of appliances long after we had a right to believe our work completed; but rather those unseen, and as yet, undetectable forces which operate to undermine our labors and our faith.

Intimation of the possible causes is given frequently in our literature in treatises dealing with the ductless glands, the pituitary bodies, with the diet, heredity, and so-called faulty cell metabolism. Yet of all that has been written regarding these, and kindred etiological factors in malocclusion, we still have not the diagnostic guide by which to determine those cases which are ultimately to fail regardless of the painstaking care put upon them, and the apparently perfect result once obtained.

Refinements of appliances will continue to follow, and we shall welcome whatever may, without sacrifice of efficiency, contribute to the greater delicacy, inconspicuousness, and cleanliness of such. But I still maintain, that at the present time all means essential to correct alignment of the teeth are available—with the devices within our reach; and furthermore, that since the discovery that bodily tooth movement is possible, no great advance in the treatment of malocclusion has been evolved.

There are those who contend that, until we plan the position of each tooth according to geometrical design, our work is haphazard and empirical, but since the human anatomy is not constructed by rule of square and compass, we must decline to give up the methods which are daily proving themselves to be of greater value; and if the genii of the profession will but turn their attention to the more elusive and abstract theories of etiology, and give the more humble of us an opportunity to perfect ourselves in the technic of such appliances as we now possess, Orthodontia will probably give them place among the immortals.

In considering the events of the past year in orthodontia, we can but be impressed with the important (?) part assigned our specialty on the program of the 1917 meeting of the National Dental Association.

On this program, consisting of approximately 135 numbers, we were honored by being permitted one appearance, surely a dental anomaly!

To even the lay mind, it must be evident that the profession of dentistry is based upon the necessity for the preservation of the occlusal relations of the teeth. That the entire purpose of its existence is that which the orthodontist has made his particular sphere of endeavor, and yet, his work was recognized to the extent of being accorded approximately 1-135th of the time of the national meeting.

Another flattering concession of the esteem in which our work is held, is given in the tentative schedule of studies as contained in the four year course in dentistry.

Out of a total of 5632 hours, but thirty-two have been assigned to instruction on the subject of orthodontia. This is exclusive of infirmary practice which is not essential to graduation.

The dental graduate is, then, without further preparation, permitted under our laws, to represent himself as an orthodontist.

This is a condition which surely needs rectifying. Either the scope of the course of study in the dental schools should be materially broadened, and more time allotted to its pursuit, or a special course given for those who desired to follow this branch of work exclusively. For in no field of dentistry can it be said more truly that, "a little knowledge is a dangerous thing."

In conclusion I would draw attention to the words of the President of the National Association regarding the narrowing influences of specialization.

We are fully aware that the tendency in following one line of work is to develop "cranks." We have them. Some inoffensive, and harmless, others obnoxious and detrimental to the welfare of our society and profession.

As appliances and methods of treatment appear in constantly increasing numbers, we are prone to adopt one as the only practical and efficient one, and to depreciate the efforts of a fellow-practitioner who may see fit to use some other, equally as effective in his hands.

The fact that the pin and tube appliance and the ribbon arch, or any other variation of this method of applying the same principle of tooth movement will accomplish wonderful results, does not necessarily condemn the plain arch of ten years ago as a relic of a past age in orthodontia.

The plain arch has as true a place in orthodontic practice today as it had when we knew no other. So, too, has the coffin split plate, and the Kingsley head gear and retractor, where indicated.

So let us broaden our vision and extend a little charity to those who may hold views radically different from our own. They may be striving as hard—yes, and as successfully as we.

Professional jealousy and the inclination to belittle the accomplishments of others in the same field of endeavor, will react upon our society, and bring dissension where, for the sake of advancement, we must have harmony and cooperation.

DISCUSSION

Dr. Robert Dunn.—Gentlemen: Our President has read one of the most able addresses in the history of this society. He has touched upon many things about which I have thought for several years. Possibly one point might have been mentioned, namely: How much credit is due orthodontists for what they have taught dentists with reference to occlusion? I hope you will thoroughly discuss this feature.

Dr. James D. McCoy.—The very lucid address of our President has brought up many points, all of which are worthy of our earnest consideration. As to the progress of orthodontia, I think he has not underestimated the value of the work of the past year. While no radical change has taken place, I believe we have all been working to the end that some of the newer methods which have been advocated have been given a rather thorough testing out. Personally, I have been working along certain lines faithfully, with the result that I have realized more satisfaction and more benefit from my practice during the past year than ever before. Dr. Canvanagh's reference to etiology I believe, is most timely. Without doubt that is the subject in orthodontia, which rather than being placed first has always been relegated to a place of secondary importance. Whether this is due to the fact that it is not well understood, or because our attention is called

by necessity to the practical questions with which we meet in every day practice, I am unable to say.

The teaching of orthodontia in dental schools of which our president has spoken, is a very important subject to orthodontia. Personally, I believe that orthodontia as it is taught in the average dental schools at this time, is rather more a menace to the students than it is a real benefit. I do not believe that infirmary practice,—the handling of orthodontia cases in the operatory by dental students should be allowed. That is a rather radical statement, but I think until this work is given a more permanent place in the dental curriculum, children suffering with malocclusions should not be placed in the hands of anyone whose training has been as limited as that of the ordinary dental student. I think the solution of the problem lies along the same lines as that which faces the man who teaches oral surgery. You can not quote many instances where senior or junior dental students would be allowed to do major operations in oral surgery. They might be allowed to assist the oral surgeon, but so far as turning over the actual work to the students I do not believe that would be done.

At the present time, the manner in which orthodontia should be taught in dental schools should be along these lines: The cases should be handled by the instructor in the presence of the students rather than have the students themselves attempt to do the work. I have observed the methods in vogue with reference to teaching orthodontia in several dental schools, and have had charge of this work in one school myself for the past twelve years. I do not believe it is just to the patients to treat these conditions of malocclusion of the teeth in dental schools unless you select cases very minor in character. One of the discouraging things to me in the orthodontia situation today is brought to my attention through some of the advertisements of companies making orthodontia appliances which I see in catalogs, dental magazines, etc. In many instances you will see advertised a large number of appliances which can have no appeal to any man possessing mechanical ability, as being anything less than pure junk. Looking through a catalog of one of the larger manufacturers recently I was appalled at some of the appliances they pictured as available, and they in fact offer to fit them to the models, with instructions to the dentists for carrying on the treatment of the cases. These appliances are bulky and ungainly and so crude it seems to me, it would be nothing short of malpractice to subject a patient to their use.

That brings up another point which does not apply to any one of us probably, but it applies to many men attempting to do orthodontia. I refer to the too often total disregard of the soft tissues. We should school ourselves to give much more attention to the care of the soft tissues during orthodontic treatment, and if we do this we must use appliances which are delicate, and whose force can be under control at all times. There is one protest I would like to make in regard to mechanical appliances, and that is the use of the clamp band. I hope I will not be considered ultraradical in the statement that I think the molar clamp band with screw on the lingual side should be relegated to the junk heap. Personally, I have not put on such a band for a long, long time, and hope I shall never put one on again.

I wish to speak of another point. We can ill afford to use any method or appliance which may be a factor in the disintegration of the enamel surfaces of the teeth, or act as a predisposing factor in caries. And with that end in view I think we should use appliances that will permit the patient to give the mouth adequate care. It is one thing for us to clean up the mouth of the patient in the chair, but if they only visit the office once a week, or once every month, the prophylaxis attention we can give them does not amount to a great deal, so far as the health of the structures is concerned. It is the daily cleaning the patients can themselves give, which determines the condition of the teeth when treatment is completed.

Dr. Solley.—Speaking of the care of the mouth during orthodontic treatment, I would like to ask some of the members present what they use where we have slight recession along the gingival border. This is not due to mechanical irritation from appliances, but where the patient visits the office only once every one, two or three weeks, there may be a slight accumulation of food particles every night and there may be a little acid reaction. I have had three cases during the past year that have given me considerable worry due to this recession. If there is anything that will help me along these lines, I will be glad to hear it. The last six months I have been using normal salt solution as a wash every time the patient comes to the office, and if possible, the patient uses it night and morning, and I have been able to get in all these cases quite a beneficial result as to the care of the mouth. In fact it has seemed almost indispensable.

Dr. H. L. Morehouse.—I was glad to note the special emphasis Dr. Cavanagh placed on the question of the etiology of our cases. I have felt, for a good many years, that therein lies the real solution to the final perfection of our work. Like Dr. Cavanagh, I think we have sufficiently perfected our mechanical devices for the present to meet the requirements of treatment in all classes of orthodontic work. But the question that is vital now is that of permanency of result, and the question of permanency in my mind depends on the etiology at the beginning of the treatment of a case,—or at least, before we have finished the case, we should know exactly what is back of the trouble, and whether it will recur unless we carry on a tremendously long drawn out retention.

Dr. Solley as well as Dr. McCoy spoke of the prophylaxis of orthodontic cases. That is very important. I do not care how delicate or how beautiful appliances may be, the question of getting the child to take proper care of the mouth is a large factor. I tell my patients,—and the parents—it makes no difference whether I take off appliances each time and give thorough prophylaxis treatment, this would not prevent the breaking down of tissues unless they do their part.

Dr. Charles C. Mann.—I wish to congratulate the President on his address on the able manner in which he presented the needs of this society and of the specialty as he sees them, and I concur heartily in all suggestions he has offered. With Dr. McCoy I feel the simplification of appliances, especially in the matter of molar bands, is of utmost importance. His suggestion as to the course in orthodontia given to dental students is of large moment.

It would seem to me with reference to the etiology, a proper diagnosis and prognosis of our cases, with a slowing up of the movement,—if I may so speak,—working slowly in some of our cases, is of large benefit.

Replying to Dr. Solley, I have had beneficial results in the use of the black syringe with normal salt solutions. I provide the patients with these syringes and instruct them to use them night and morning about two hours after meals, in conjunction with the regular methods of cleansing the teeth. This has been found in my experience to be very beneficial in preventing decalcification.

Dr. Allen Suggett.—Mr. Chairman: I enjoyed the president's paper very much. He touched on many interesting and vital things. He mentioned certain jealousies and those little conditions which are quite natural to manifest themselves in a comparatively young profession. The profession of orthodontics is rather young, and we perhaps are more interested in certain men than we would be later on. In dental colleges, we had the same thing years ago. Dentists no longer congregate into groups—those from Harvard, Michigan, Pennsylvania, etc. I think that phase is passing. As to the matter of the teaching of orthodontia in dental colleges, I think they are all open to conviction. I think that is a question which will require a little time for us to decide on. So far there have been but few opportunities for getting an education along the line of our specialty. There were the Angle School, Dewey's School, Brady's School and, until the Forsyth organized a course, those were about all we had. The Angle School is no longer available. The only thing we had at the beginning was the instruction given in dental colleges, and that was poor at its best. About all we can hope for along that line is to get the students familiar with malocclusion in all its different forms and teach them how to diagnose it. I think we fail more in the matter of teaching the dental student to diagnose the cases than in any other way. We find embarrassing things among our classmates sometimes. Some of the advice given is unforgivable. Whether it is best to take a few cases and carry them along ourselves, or whether, we shall put some of them in the hands of the students, I find difficult to decide. I think we may do a little of both. If we could have plenty of demonstrators, so that each student could be shown how to put on his bands and adjust his arches properly, that would give him a pretty good idea. Leastways, he would have a pretty good knowledge of what not to do. The advice, which is often given with reference to orthodontia, is about as bad as it can be. Some dentists send cases to the specialist, and in order to save you a little trouble they will remove a crowded lateral incisor or cuspid. You do not always know what has been said to the patient else you might not put the dentist in so badly. But I think, unless we do instruct the students by means of lectures of infirmary work, carrying them along and giving them a good idea of orthodontia, I do not know what kind of advice they are going to get.

We could go into the societies more regularly, write more papers, give more illustrations, with the idea of educating the profession. Perhaps that would be the better way. I think I have neglected my duty and perhaps most of us have. I rather believe

that is the biggest field for our labors, as the dental colleges do not pretend to make orthodontists.

Dr. Mann.—Two things appeal to me with reference to the instruction of dental students. As long as we have three instructors in orthodontics present, it may be timely to mention them. One is the conception of facial normality and arch symmetry according to the type,—and the other is the thorough understanding of normal tooth forms, mesio-distal diameters, etc.

Dr. Solley.—Dr. Cavanagh said at the present time a great many of the orthodontists have their minds focused too fully on mechanical principles. Two things appeal to me strongly. In the schools which teach orthodontics two subjects should be covered more fully, one is the more minute anatomy of the head, and the other is a more thorough study of physiology. I think those two subjects are very important to the man who is starting out today as an orthodontist. We must get down to the etiology of this subject and study it from a more scientific basis than we have done heretofore.

Dr. Morehouse.—I wish to take issue with Dr. Suggett in regard to the question of the colleges teaching more of orthodontics to the dental students. I think there is too much of it taught now. I do not think there is anything so harmful to the laity as the teaching of orthodontia which is being given in dental colleges. This is because they are trying to teach the students how to use in a small way (as they all admit) the appliances we have at hand, and attempting to give them an idea of the diagnosis of malocclusion. I think the general practitioners of dentistry in the United States, who can properly diagnose orthodontic cases are indeed very few in number. If they would just simply learn normal occlusion, and not when the teeth are not normal, they would avoid doing much harm. If they would only refer the cases to the orthodontists without any remarks, oftentimes difficult situations would be avoided as between the family dentists, the patient and the orthodontist.

Speaking quite personally with regard to the dental profession of Spokane, I have had much pleasure in working with the men there, and I am safe in saying I believe that fully fifty per cent of the practitioners appreciate the relationship that should exist between them and the specialist in orthodontia, and accordingly refer the patients without any statements to parents as to what treatment is necessary. The average man who tries to give explanations regarding orthodontic treatment is simply trying to give the impression that he knows a little something, or as much, as the orthodontist does. Some may say "I could do this work, but have not the time and do not wish to be bothered with it." The honest general practitioner says "I do not know anything about it: it is not in my line and I would not give any attention to it at all." That is the attitude of the general practitioners in my city.

So I feel the dental student should be taught to recognize normal occlusion, and to know when the treatment should be started.

Dr. James D. McCoy.—I do not want to be misunderstood as implying I do not believe in the teaching of orthodontia in dental schools, as I do. I made the statement that orthodontia as taught in the average dental school, is more a menace than a benefit. As to the method of teaching, I believe, as I said before, that orthodontia should be considered in just as serious a light as oral surgery, or any other work which requires a skilled operator. In my own work in teaching this specialty, I have followed out in the past twelve years, various methods, and I have been thoroughly and totally discouraged. At the present time I follow this method: I have an assistant and demonstrator who gives one half of his time at the college. He is a conscientious and mechanically capable young man, and during the past year he has placed the appliances on the teeth of those patients accepted for treatment. (I pass upon these cases of course, turning down those cases which I do not believe can be brought to a successful culmination.) So my assistant fits the appliances in the presence of the student, who is to carry the case through. When the appliances have been fitted, the student makes the adjustments in the regular course of treatment, under the direction of the demonstrator. I do not believe the students should even do that, but I have to adjust myself to circumstances as they are. If the methods we are following do not prove successful, personally I am through,—unless I can carry out the work in the way in which I think it should be done.

During the lectures, in which I cover the subject matter of the textbooks, I try to impress the student with the fact that the treatment of a case of orthodontia is a serious matter, because we are dealing with one of the most vital and one of the most

wonderful portions of the human anatomy. No one of us would think of taking a child of our own who needed an appendectomy, or any other serious operation where life and death is concerned, to someone who had but a smattering knowledge of surgery; nor would we place a child in the care of an incompetent school teacher, as we realize the future happiness and usefulness of the child is, in many ways, at stake. If one had a child suffering with malocclusion, I wonder how many of us would be willing (supposing we were not orthodontists, but had some conception of orthodontia) to have our own child undergo orthodontic treatment in the average dental infirmary? Personally I would rather have the case go untreated than have the child subjected to what the majority of patients are subjected to at the unskilled hands of the dental student.

Dr. Carter.—I wish to compliment Dr. Cavanagh on his very excellent paper. He has brought out a number of points worthy of our very serious consideration. I was much impressed with what he said with reference to the mechanics of orthodontics. There seems a tendency in some quarters, to make mechanical engineers, or civil engineers out of us, and while I believe that what has been done along that particular line has been of some value, there seems to be a tendency to commercialize in this particular direction. Dentists who have had no orthodontic training whatsoever, and who are unable to diagnose a case of orthodontia, are asked to send in models, from which maps are made and returned, and the dentists are allowed to carry on the cases. While this work may have been of advantage, I believe we can not treat malocclusion by rule of thumb, because we are dealing with human beings and not with a steam engine or something of that nature.

Regarding the teaching of orthodontics in schools, I believe that is a very serious problem. As outlined by Dr. McCoy, where we have a conscientious instructor at the head of the department accepting only such cases as he believes can be carried to a successful end, there probably can be a great deal of good attained. In this particular respect there is again a tendency to commercialize, and many cases are doubtless accepted, not purely for scientific reasons, but for financial reasons. I do not know how it can be best accomplished, but I believe something should be done to protect the public, because no dental student can fully realize the responsibility he assumes when he undertakes orthodontic interference, unless he be under the direction of a competent instructor. He is liable to do much harm, and may change the dental irregularity from one class of malocclusion into another.

Regarding Dr. Solley's remarks as to the care of the mouth, I have used in my own practice a very simple mouth wash which is very cheap and easy for the patient to get. I recommend they go to the paint store and get a chunk of unslacked lime: place it in a quart bottle, shake it up and allow to stand for 24 or 48 hours until the lime settles to the bottom. Pour out into a bottle or container, and wash the mouth with this lime water. I find that keeps the plaques off the teeth and maintains the mouth in pretty fair condition, and it is also healing in its influence. I got the idea in reading along some prophylactic lines. I believe it is recommended by Dr. Fones, of Bridgeport.

Dr. Sobey.—Just a word with regard to Dr. Suggett's suggestion as to reading more papers before dental societies. I believe most of the men who read these papers will agree that when an orthodontist appears on the program the dentists to not appear at the meeting.

Dr. B. Frank Gray.—I am sure Dr. Cavanagh's address was most interesting—as is evidenced by the very nice discussion which has been accorded it.

As Dr. James McCoy was speaking with reference to the methods of teaching orthodontia to dental students, I recalled that Dr. Frederick S. McKay arrived at the same conclusions a few years ago. Dr. McKay, like Dr. McCoy, if I understand Dr. McCoy correctly, believed the students should not even be permitted to carry on the treatment of patients in the dental school. He felt the ideal way would be for the orthodontist in charge to select the patient, fit the appliances in the presence of a small group of students, and conduct the treatment himself, demonstrating each step of the work thoroughly to them.

Dr. McKay's experience both as a teacher in the Angle School of Orthodontia, and in teaching in a dental school, should make his opinion of value.

Dr. Guy S. Millberry.—Mr. Chairman: I thank you for the courtesy you have extended to me. Administrative duties at the school interfered with my being present here earlier in the day, and I regret very much that I did not hear Dr. Cavanagh's address. Not

knowing just what he presented I shall have to speak to the discussion rather than to the address.

The question of dental education has been of paramount interest to me for many years. I feel that the orthodontists have a very well defined problem and a duty in presenting to the dental educational institution their views with regard to the teaching of orthodontics. I disagree with some of the speakers who claim that it should not be taught in the dental schools. The progenitors of your speciality have labored hard to the end of carrying orthodontics into medical science as a specialty, although we have generally believed it to be a specialty in the profession of dentistry. To whom will you look for training in this specialty and the education that is necessary to fit one for its practice, if the dental schools are not the proper place? If more attention must be given to this subject then it should be the duty of the dental schools to teach it adequately. If no training is given in the dental schools and men go out into the practice of dentistry without some special training will they be able to secure enough training in the basic principles in your field of work while attending the short courses now being given privately to make them proficient? We are going to have more time during the four-year course to give to this subject, and in my opinion it should be developed.

The time is not far distant when the man who chooses dentistry as a profession, will enter a college or university for two years of academic work where he will receive fundamental instruction in chemistry, physics and biology, plus some cultural studies. During the next two years in the university he will then study the basic subjects in medical science, namely anatomy, physiology and pathology. Anatomy is frequently taught very thoroughly and often very carelessly. In some schools it is given in concentrated form during one semester only. In other schools it is spread out over a period of two years. A knowledge of anatomy is very essential to the orthodontist. Physiology is probably one of the most neglected subjects in dental educational institutions today, and it, likewise, is an all-important subject to the orthodontist. After having completed his basic preparation in medical science the student will then enter upon a study of his specialty. In medicine it may be as a rhinologist or internist or a surgeon. In dentistry it may be in orthodontics, in prosthesis, in surgery, and ultimately all of them will be included in the general science of medicine.

Your work occupies a sort of interrelationship between rhinology and dentistry, and as I study the problems involved, it seems to me that more is expected of those men having control of the mouth, nose and throat than of any other group in medical science because their work is preventive in character, and they can alleviate further suffering more than any of the groups mentioned.

You should evolve some plan whereby orthodontics can be taught in a more general way to the regular dental practitioner. He should be more familiar with your work, and if the members of the dental societies will not listen to a paper on this subject, why not have a section in the National Dental Association devoted to this special field in medicine with its own particular place in the annual program. If you limit your literature to a journal on orthodontics exclusively, very few of the regular practitioners of dentistry will subscribe for it, whereas if you had a section in the journal of the National Dental Association devoted exclusively to orthodontics a very large percentage of the men in this country would be likely to read it, and you can thus disseminate your knowledge.

As an association, the Pacific Coast Society of Orthodontists can have a wonderful influence in helping to mold orthodontic practice in the West, and especially so if you lend your assistance to the institutions who desire to do what is best and right in this regard. I believe that every student entering the dental school should be taught as much as is possible in the subject of orthodontics. There are very few specialists in communities of less than twenty-five thousand people. Men who are practicing in communities of six to ten thousand people should have a fairly good knowledge of the subject so that they may be in a position to either direct the patient to the specialist in the city or be able to render some service themselves if the case is not too difficult. They should at least understand the requirements of a given case and of the complications involved in the handling of it.

I trust that your Society will feel free to call upon the University of California for any assistance that it may be in a position to offer you, whether it be in facilities for disseminating knowledge or in investigations of any sort, and I also trust that we may feel free to call upon your society for such help as you can give us in developing this problem. I also hope that I have not digressed too widely from the subject presented

in your President's paper, and again thank you for the privilege of being in attendance at your meetings.

Dr. Mann.—As to the matter of bringing orthodontic matters before dental societies, in the County Society in Seattle, we have one night devoted to orthodontia, and the meeting is well advertised among the men. If I may be permitted to say so, that meeting is well attended. It has proved a satisfactory arrangement.

Dr. Cavanagh.—I wish to thank the members present for their kindly consideration of my address—the first of its kind I have attempted. I feel I am only now prepared to write an address for this Society, after hearing the discussion. To enter fully into the points brought up and discussed here would require a longer period of time than the writing of the address in the first place. I feel flattered by the very full discussion you have given it, and would like to touch upon many subjects again but can only take time for a very few.

It is a peculiar circumstance that in dental colleges, where so much time is spent in the prosthetic laboratory upon the arrangement of artificial teeth and in the making of artificial dentures, that from that work the student gets no conception of the normal occlusion of the teeth! They can arrange a set of teeth so that the cusp relations will be right, but in the mouth where malocclusion is present, they have no idea of what is wrong. It should occur to the student from his instruction and training in prosthetic dentistry, how to recognize malocclusion, but they do not connect the two ideas at all.

Now as to the teaching of orthodontia, I find it a joke—if you can conceive of a serious joke—to try to handle perhaps forty or fifty cases in the dental infirmary. One man is expected to lecture an hour on a stated day, giving perhaps thirty-two lectures in all. I am given one-half day in which to demonstrate in the infirmary. It is impossible to handle over five or six cases correctly in that length of time. I think no attempt should be made to compel a dental student to take any practical work in the infirmary, and if the choice is given and any one in the class is going to be favored with special instruction, it should be given to those men who have determined to locate in the small towns. The best men in the large cities do not attempt orthodontia. The man who does the best work in his regular dental practice says: "I know too much to attempt a case in orthodontia." I state to the class that I am not going to make orthodontists out of them. That I will try and teach them the etiology and the diagnosis so they will recognize malocclusion, and then they are advised to let it alone. I endeavor to teach the part they play in bringing about malocclusion, so they may avoid it. That is all we can teach today, under the present status of things.

As to the prophylaxis of malocclusion, the dentist can contribute immensely in some of the serious cases we have to handle. The effort to teach the application and use of the more delicate orthodontic appliances to the students, should not be undertaken. It does not belong in the dental course. I think the student may be made familiar with the use of appliances which are intended to prevent malocclusions in their incipiency. For instance an anterior tooth may be diverted in twenty-four hours at times, from an approaching condition of malocclusion to one of normal occlusion.

In touching on the remarks of Dr. Solley and some others, I wish to say as to the recession of the gums, this is at times due to too rapid tooth movement rather than to any uncleanliness on the part of the patient. We get an absorption in such cases, which may never be replaced, through an attempt to force cases too rapidly. Especially does that apply to adult cases where you attempt to hasten the movement. This condition is especially noticeable in the lower anterior region.

Our relation to medicine, as Dr. Millberry has intimated, is very close. We should have the very hearty support of the nose and throat specialists, and especially should we have the cooperation of those men who realize as I think Dr. Cryer has said, that orthodontia is more difficult than anything else, unless it may be oral surgery.

In the matter of orthodontists appearing before dental societies, some of the same things are required as in the teaching of dental students. We must have models, appliances and the lantern. You can secure attention in that way. I will never read another paper for a dental society unless it is an illustrated paper. The dentists do not come and do not know whether the paper may be good or not. They are down where the dental supply houses have their exhibits and you have nothing of that kind to offer (nickel-plated instruments, etc.)

Here on the Pacific Coast, where we so frequently have prominent dentists from the eastern part of the country as lecturers and clinicians, we should have an orthodontist who would also attend our state conventions. He could present these subjects,

with the proper aid of slides and models, showing the very conditions we are supposed to teach in dental colleges.

The neglect of the temporary teeth by the dental profession is deplorable. Not one per cent of the dental profession take care of the deciduous teeth as they should. They postopone the filling of this cavity for a while: it is so very small now. The patient comes back after an attack of pulpitis. Then a pulp treatment is required: there may be an abscess and you have to remove the tooth and there is an interruption of the development of the dental arch. Malocclusion results, especial in the temporary molar region. Those are the things we have to teach dental students, and we must bring them more emphatically before the dental societies as well. And I think we should also teach these things in the societies of the nose and throat specialists.

We know little of inherited conditions. What can we do with an inherited condition? I believe they play a more important part than the textbooks give credit for At one time it was given a more prominent place than today, and yet I am convinced that heredity plays a most important role in some of our most stubborn cases. We can attempt to correct them, but we have no power over them. It is the local and acquired conditions which we can deal with successfully. As to the conditions of malocclusion acquired through bad dentistry, we should be able to do much in the way of enlightenment, presenting the matter to the profession through the aid of models, illustrated lectures, etc., as suggested. I am not in favor of giving the dentists a smattering of the knowledge we possess by bringing before them appliances to show them how to regulate teeth. Until the fundamental principles of the prevention of malocclusion are understood it will serve no useful purpose.

Death of Dr. John W. Parsons

ON February 28, after an illness of one week following an operation for appendicitis, Dr. John W. Parsons passed away. "Gone, but not forgotten" can truthfully be said of him, for there was no one who had more friends; in the words of old, "He was loved by his fellow-men."

Dr. Parsons was one of the organizers and first presidents of the Huntington Dental Society and was always active in the upbuilding of the profession in his state. He had been and was at the time of his death secretary of the West Virginia Dental Society. He was also president of the Alumni Society of the Dewey School of Orthodontia from which institution he graduated two years ago. Upon taking up the practice of orthodontia, his efforts were characterized by the same painstaking methods as were observed in the practice of dentistry.

He will be missed by all of his friends in the dental profession and by none more than by those who knew him in the field of orthodontia. To his classmates at the Dewey School of Orthodontia his death was a great sorrow. To the editor his friendship was one most highly appreciated and as fitting tribute to his character we know nothing better to say than—he was loyal to his friends.

—M. D.

DENTISTRY FOR ALL THE PEOPLE*

By Allen H. Suggett, San Francisco, Calif.

A COMPREHENSIVE survey of all the benefits that dentistry in all its branches is conferring on those who can afford to pay for it, would naturally suggest the question, What effort is being made to make these great benefits possible to all the people?

If good teeth, healthy mouths, and perfect occlusion, are so necessary for the health, comfort and happiness of all the people, then to bring this about, should be the ultimate goal of every dentist. Some of the other countries are making greater strides than we are. In 1910 the school children of thirty-three cities in Germany were furnished dental services by the government. England is proposing to socialize medical and dental services. Russia is about to do it, and no doubt will, as soon as they have time to put it in force. They already have over six thousand cooperative societies.

Not many years ago, schools were only for the rich, and colleges only for the literary. Everyone who could not pass an examination in the classics was thrown on the scrap heap, as far as a chance of getting an education was concerned.

This condition has gradually been changed to meet the wants and demands of society, until instead of just one literary course, there is at least one university, that gives as many as 500 different courses.

The trend of the times, is to have conditions so favorable, that everyone coming into the world, will have a chance to do the thing for which he has the most talent. Schools, industries and the professions are being socialized, as never before, for the most conservative have to admit that the common good must first be served during these times.

If it is necessary to take care of our health, so we can fight better, why is it not equally as necessary in the great fight for subsistence?

If we take the bodies of the fathers, sons and brothers, and put them in the trenches, from which many never will return, if we can take the lives of our people, for the common good, why not take the wealth for the common good, not only for war, but for peace, health and happiness.

We have free schools and free books, but what good are these, if we do not conserve the health. It is not even good business to neglect the physical and mental well being of people, and then have to support them in idleness in hospitals and jails.

I examined the mouths of five hundred children in five of the public schools of this city, and found about 85 per cent in need of dentistry. Some had as many as twenty-one cavities, many had abscesses. Frequently the abscesses had broken on the face producing permanent scars. Many of them had worn poultices of fat meat, etc. It was pitiful to see some of them suffer from toothache and lose valuable time from school. There was the usual percentage of

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malocclusion with all the accompanying symptoms, narrow arches, receding chins, adenoids and tonsils, etc.

The expense of dental services is beyond most of them, for they are not properly clothed and fed. Here is the source of the great horde of unfit, that rise up against society, and they beget more unfit, and more.

Medicine is working toward prevention, dentistry is dreaming of a time when we will prevent, rather than cure. We will also be one of the important factors in preventing the unfit. Now is the time when everybody is thinking of the common good to push these democratic measures. They will be opposed as impractical, just as freeing of the slaves was opposed, and free speech and free press, free public schools, and the pure food law, and the thousand other rights the people have won.

If it is democracy to take care of the mouths of the soldiers and sailors, why not for the people? We are making a feeble effort to do it by charity. If they have no right to this service, why attempt it by charity? If they should have it, it should be done by tax support. We give charity when we should give justice. Charity only puts off justice. If all the rich and influential people who are in the Associated Charities, the Catholic Societies, the Hebrew, the Methodist, the Episcopalian, and the hundred and one societies who are working so hard to relieve the distress of the poor, should unite all their resources and demand of the legislature and city councils appropriations to do this service under the State, County and City in a democratic way it could not be refused.

Now is the time to push all these measures forward for the people are thinking of service as they never thought before. If soldiers can not fight effectively without good teeth and healthy mouths, how could they mine coal, can fruit, plant crops, and make delicate instruments.

There are plenty of dentists and physicians who would gladly work for the state, for much less than they might make in private practice. To prove this, we need only mention army officers, judges, college professors, etc. It is important to remember too that as these democratic measures are introduced, when more and more people are interested in service, we will begin to see that the pay will be more nearly equalized.

If the greatest surgeon, the greatest physician, chemist or engineer, men who have spent years and years preparing to be experts, if these men are only paid a few thousand a year, why does society pay other untrained men millions. Even the president of the United States is only paid $75,000. The policy of big business is to pay the workers small wages and the higher ups enormous salaries. The government's policy is to pay the workers more and the higher ups less.

The great trouble is, that each one is more interested in getting unearned money than in solving the social problem. The great business interests are not trying to solve the problem. They are so well pleased now that their powerful influence is against any change. They only think of a change that might put them down and another fellow up in their position. It is the position that should be abolished.

When these big leaks have been stopped, the huge unearned fortunes abol-

ished, there will be plenty of means so every child can be educated to do the thing he or she can do best. They can have their teeth preserved, their health guarded, and everything else that is necessary to make a good and useful citizen.

As we remove graft and special privilege, we will automatically remove that powerful group of men who oppose all democratic measures, and it will never again require eighteen years to enact a pure food bill.

If dentists were employed by the county just as the teachers, the judge, and the sheriff, and county physicians, they could do preventive work instead of almost entirely reparative. Dr. Fones reports that as a result of four years' prophylactic work, he has been able to reduce caries from 85 per cent to 15 per cent.

There would be many details of the *modus operandi* to work out as they came up. As to pay, it would be less than many are able to make in private practice. For those who would prefer state work, there would in time be worked out pensions, etc., as in the army, so that the dentist would not have to save up for a day that might never come. He could freely and safely use his income for the education of his children, pleasure, etc. If his children were properly educated they would be able to earn their way in the world. If every one had to serve and earn his way, useful labor would cease to be a reproach. There would be no wealthy unemployed, there would be no poor unemployed, and all could serve in their own way.

DISCUSSION

Dr. Cavanagh.—You have heard Dr. Suggett's paper and those who read the current literature of the day know that what he has written is in line with the tendency of the times the world over. The world is becoming more socialistic. Things transpiring daily bear this out. The underdog is having a better chance, and the man receiving too much must be content with a little less. In dentistry we have just touched the wealthy you might say, and left the masses without our services. Dr. Sobey will open the discussion on this paper.

Dr. Sobey.—Dr. Suggett has given us a paper on a very broad subject, dealt with in a very broad-minded way, and showing that he has given this matter his particular attention. Records show that his interest in that matter dates back at least to the year 1910. I feel it well in discussing such a paper to outline to you some of the work that is being carried on in our own locality.

At the present time in the San Francisco schools two dentists, with assistants, are employed each for one-half day, and are paid out of a fund appropriated by the Board of Supervisors for that purpose. At a recent meeting of the San Francisco District Dental Society a resolution was adopted "that steps be taken to have provision made for the employment of twelve dental hygienists," and furthermore, that a room in every new school building erected in this city be equipped with "adequate facilities for school health activities." In doing this we are following the example set by Dr. Fones in the schools of Bridgeport, Conn., of which Dr. Suggett has made mention.

The University of California makes provision for the health of its students by providing medical and dental services for a very nominal charge to make the infirmary self-supporting. At present two dentists working a full day each can not handle the work which presents itself.

In our two State prisons all convicts upon entering are given first a physical and second a dental examination. 91% are found to require future dental services which are charted at this time. Extractions, treatments, cement and amalgam operations, dentures and clasps are free, gold and porcelain work being done if the patients can pay the costs of materials.

Probably the biggest thing in social advancement for the people of the state is a proposed amendment to the constitution which will empower the legislature to pass

any kind of social insurance bill. The Los Angeles County Medical Society has drawn up a tentative act which has been published, and is under discussion by other societies. Its subject is "To enable the worker to meet the expenses of his illness and to compensate him to some extent for the loss of wages upon which he and his family depend for their sustenance."

If dentistry follows in the footsteps of medicine the time will come soon when all the people of the state will be properly cared for.

Dr. Dunn.—I think we are very much interested as a society in what we can do in our line of work for the children of the poor. It seems almost impossible to solve this question, because of the vast amount of detail and responsibility attached to malocclusion of the teeth. It would seem if the poor are to receive orthodontic services it must be through such an institution as the Forsyth or Eastman Dental Infirmary—that is through an endowed institution. All of us I think take one or two of these cases and carry them through. As a rule these patients are with us for several years. We do not have the full and necessary cooperation in the treatment. We undertake them because of some vitally important consideration which makes it seem so urgent. I do not believe it is possible for us to undertake to do much of this work. Through proper teaching we should be able to show how, through a little attention to the deciduous teeth, many of these conditions of malocclusion can be prevented. We are all familiar with the vast amount of work being done along preventive lines among children. If we could educate those having that work in charge, in preventive methods, a very great deal of malocclusion of the teeth might be stopped in its incipiency. I see no other way in which we can possibly handle the subject adequately.

Dr. Suggett.—I think Dr. Dunn missed the trend of the paper a bit. It is not a question of what we do. I am absolutely against charity. We may, however, need to do some charity work in our practices. I help some of these cases like others, but I oppose the idea. This work is not to be attempted by Dr. Dunn, by myself, or other individuals. Such a method is not democratic. We must not follow the methods of the Associated Charities who solicit subscriptions of $6 or $7, or possibly $100, or $1,000. This service needs to be performed by some state or national institution which is tax supported, the funds coming the same as for schools, etc. Charity does not solve the problem.

Dr. James D. McCoy.—I think our essayist has considered this very important subject in a broad and comprehensive way. He has outlined a very Utopian state of affairs which I am sure we hope may be realized some day. If such things are to be realized they must have a start, and the sooner we can commence educating the people to think along these lines and realize the benefits of humanity which would come from such a plan the better it will be for the people at large. I think so far as dentistry is concerned the masses may be educated in no better way than through the methods in vogue in the San Francisco and Los Angeles Schools. We have in these schools, working under the direction of the school board, dentists who care for the mouths of children free of charge. This work is done only for such children as could not otherwise have the work done. This movement started in Los Angeles a number of years ago. The Los Angeles County Dental Society subscribed enough money through its individual members to employ a dentist who was compensated at the rate of $1800 per year. The Dental Society provided the equipment. Through a great deal of argument and much pressure the School Board finally consented to allow us to place this operator in one of the schools. We called this our special "Parent-Teacher's Clinic," I think. The clinic rooms were on the grounds of one of the schools located in a poor section of the city. They allowed us to put our operator at work there, taking care of these children. It really required the pulling of wires in order to confer this benefit, but we were eventually successfully, I have stated. In one year's time the benefits to the children were so great (you can realize one operator could not do a great deal) that the following year the school board assumed the responsibility of this clinic. Instead of employing one dentist they secured two, and have maintained them ever since. Shortly thereafter they also established in this clinic (now known as the "Parent-Teachers' Clinic") a clinic for the eyes, nose and throat. Therefore that work is now being carried on, not as a charity, but as a democratic measure for the care of these school children.

The operators now employed in the Los Angeles Clinic can not take care of more than just the emergency work. I think through educating the school teachers, school boards, etc., to the great benefits of this work the time will eventually come when every

school will have its dental as well as other clinics established, and it will all revert to the advantage of the children. Of course dentistry as it is practiced for the most part resolves itself into the question of reclaiming dental wrecks. When we are dealing with children we can make it a matter of prevention too. If these things prove to be successful with the children of course it will encourage politicians,—or statesmen, as sometimes we have statesmen as well as politicians—to institute these measures along other lines.

Dr. Guy S. Millberry.—Social dentistry has evolved out of the problem of school dental hygiene in which I have been very much interested for the past ten years. The reader has mentioned some phases of the work in other countries, speaking particularly of Germany. We have not been able to get very specific information during the past three years from foreign countries, but we do know that our own country has made very rapid progress in an effort to socialize dentistry here, especially with regard to the children in the public schools. While it is generally believed that Germany and England took the first steps in regard to school dental hygiene, the progenitors of socializing dentistry, you may be interested to know that such is not the case for in Rochester, New York, in 1889, two years before the work was commenced in Strassburg, the dentists of the former city began work which ultimately resulted in the esablishment of the Rochester Dental Dispensary. This institution is designed to study the problems of preventive dentistry, to find out whether the work in prophylaxis early in life will prevent all those diseases which we maintain can be prevented by such methods, and so we have a Research Institution there rather than a public clinic.

The work in the Forsyth Infirmary is primarily charitable in character, and it was formulated on such a basis by the Forsyth brothers, one of whom experienced, during his travels, the discomfort of having had to listen to the wail of a child through the night who suffered from a toothache. Isn't is remarkable that such a wonderful institution has come out of the experiences of a child suffering from a dental disorder! A statement has recently come, indirectly from the Forsyth Infirmary, in which it is claimed that they find that 96 per cent of the children below the age of 6 years have some form of irregularity of the teeth, and that as a result of examination of a number of children below 4 years of age there is little evidence of the need of orthodontic work. Whether measurements have been taken to determine the width of the arch as a diagnostic aid in confirming this or not, I can not say, but if it be true that the children before the age of 6 years do not require orthodontic treatment in a large percentage of cases, and that they do require it after the age of 6 years, will it not be possible to devise some means of preventing malocclusion early in life? Perhaps the suggestion of your President that hereditary influences are important factors would have a bearing on the study of this problem from the standpoint of prevention.

If Fone's unverified reports that he has been able to reverse the problem of caries so that where we formerly found 85 per cent of the children suffering with carious teeth and now find, under the school hygiene and prophylaxis as practiced in Bridgeport, that but 15 per cent have carious teeth, would it not be a very wonderful thing for us to endeavor to so socialize dentistry as to enable the larger portion of our people to go through life with a reasonably sound and a fairly accurately occluding set of teeth?

It may interest you to know that the preventive work in dentistry both in England and Germany was largely the result of the Boer War. Men in the military service in both countries suffered greatly from dental disorders, and a large number of recruits were rejected because of bad teeth. These recruits of course came from the industrial classes, and the government realizing that both the military and industrial classes come from the children in the public schools, immediately set to work on the problem of preventive dentistry in the public schools, in order that the industrial workers and the military forces would not be subjected to the ravages of the dental diseases when their services were needed most by the government.

In regard to the conditions in our city schools in San Francisco, Doctor Suggett has touched upon this problem. I recently had a conference with Doctor D'Ancona, member of the Board of Education of this city, and the suggestion was made that we establish in every new school building under the new bond issue, a dental office in connection with the nurses quarters and the medical officers quarters. He felt that the matter could be very easily arranged for, so that we will probably have a small suite of rooms in every new building devoted to the health of the children, for we have to carry out not only the idea of educating the children mentally but physically as well.

In Los Angeles they have three dentists employed by the Board of Education, and

there are 85,000 children in the public schools with only three women to take care of them rendering dental service. The problem is staggering.

As to taxation, whenever we discuss this phase of the work with people who have been charitably inclined, they hold up their hands in holy horror at the idea of being taxed for this particular work. Perhaps after the war is over some of the taxes, which at the present time are unusual in amount and character, may be devoted to some other phase of endeavor with profit to the people of this country.

I think that this Society, as well as others, can influence the people through educational methods. How many of you are cognizant of the work of American School Hygiene Association, which at its annual meetings discusses every phase of the child's welfare including social and sexual problems, sanitation and ventilation, hygiene and especially the care of the mouth, teeth, eyes, nose and throat. I think it would be a good thing for each orthodontist to take out membership in that Association and inject into it their ideas along the lines of preventive dentistry from their own particular viewpoint.

Dr. Solley.—I do not know if I understood Dr. Millberry correctly or not, but in his mention of the report of the Forsyth Dental Infirmary I believe he said the amount of irregularity among children under four years of age is almost nil.

Dr. Millberry.—Very nearly.

Dr. Solley.—I can not agree with that. I think the most of us have seen much irregularity in children under four years of age.

Dr. Dunn.—That is because the examiners were not sufficiently familiar with the deciduous teeth to be able to determine when a condition of malocclusion was developing. There is no question in my mind, after some years of experience, that wherever there is an irregularity developing at eight years of age, it must have been present in its incipiency at four.

Dr. Suggett.—Mr. President and members: This is a subject about which we shall hear more in the next few years. If we stop to think, we must appreciate that we have barely scratched the surface, and that it will be impossible to serve the people in any adequate manner, unless we socialize it in some way. Kicking against taxes is a sort of habit with a great many people. I have a friend who has made a large sum of money. He came here and started at $25 a month and now is worth several millions. He is long on charity and likes to head the list, but whenever his taxes are raised a little, he nearly has a fit, and seems to believe the government is his enemy. Anything that is along the line of tax support he is absolutely down on. But I believe we get more for our taxes, as poorly as the money is sometimes expended, than for any other expenditure. As graft is done away with, we will eliminate the influence of the people who fight against our democratic measures. With the elimination of graft these people will become interested in good schools, good roads, good government,—like anyone else. With this improvement in his outlook, it is not difficult to see that in due course of time he might come to wish for good conditions for everybody, as well as for himself.

To develop the nation, means that we must develop all the people. That would mean that all the people should have an opportunity for education and health and an equal chance in life.

Dr. Mann.—If you will pardon another reference to Dr. Sugget's paper I will say it is to be devoutly hoped this socialistic millennium which he proposes shall come about. When it does things will be so organized that every individual will do only the amount of work necessary for his maintenance, and there will be no necessity for the democratic distribution of wealth.

Dr. Cavanagh.—Verily we have Trotskys in our midst. We can appreciate the chronic kicker on taxes. He is like the chronic kicker on the payment of our fees. It makes no difference whether a person receives from you an estimate of $500, or $250, or whatever it may be, he had it in his mind when he entered your office to complain at the fee and he will do so at any rate. The idea of graft in the government I think causes some of the reluctance people have felt at paying their taxes, and I think some of them who pay our fees feel that there is a little graft in it somewhere.

HISTORY OF ORTHODONTIA

(*Continued from page* 116.)

By Bernhard Wolf Weinberger, D.D.S., New York City.

W. E. MAGILL, in order to rotate teeth, constructed a plain band of platinum, cementing it to the teeth. Although this type of band had been used centuries ago by the Phœnicians, and was later reintroduced in orthodontia by various men, C. A. Harris and others, prior to Magill, it is now sometimes known, erroneously, as the Magill band. In a letter to Dr. Farrar, Magill said in speaking of the use of this band and its priority, "I did not make use of it until 1871, and do not claim it now."

The real value of the plain band, however, dates from its attachment to the tooth by means of oxyphosphate of zinc cement and here again we have no definite way of determining the question of priority of use as both Drs. Shepard and Magill failed to record at the time their method of attaching the band to the tooth.

Just when oxyphosphate or oxychloride of zinc cement was introduced to the dental profession in America we do not know, however, we find that it was used prior to 1870 in England, but as far as records are available we fail to find the use of cement for orthodontic purposes mentioned prior to Magill or Shepard's time. Dr. Farrar, in his *Irregularities of the Teeth,* etc., page

Fig. 1.—Magill band.

1229, says in regard to both the band and use of cement, "Magill wrote to me (Oct. 15, 1888) as follows: 'Referring to record of work done, I used the cemented band in 1871. Have never made any claim to priority of use. I make each band of platinum; form it on the tooth to be rotated; remove it to solder, and afterwards adjust and solder on the bar. My use of the bar was coincident with the use of the band because the object of the mechanism was to rotate a cuspid on its axis.'

"*L. D. Shepard* claimed he had used cement for this purpose as early as 1867 but the kind of cement he used I have been unable to learn." (Farrar.)

Magill before the Pennsylvania State Dental Society, 1888, published in the *Dental Cosmos,* page 678, spoke on *Dental Irregularities and Their Corrections,* as follows:

"When irregular teeth are presented for examination and advice, the first question to decide is whether you had not better let them alone. This is the question of questions, upon the wise decision of which may depend your reputation, your comfort for a considerable period, and not only your comfort, but various important results to your patient. No hasty conclusion should be adopted. Nature can do wonders, and may be competent, if given time, to

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right all that seems wrong. The desire to experiment on a new case, or to try a new appliance, is always strong enough to be difficult to resist. However these influences move you, make up your mind once for all at the outset, that no fee, present or prospective, shall induce you to undertake a case against the dictates of your deliberate judgment.

"I am in favor of intermittent force for moving teeth, and for the following reasons:

"1. It involves less pain to the patient, or, what is equivalent, gives periods of rest and relief from soreness.

"2. It is the safe plan. It is but seldom we can move a tooth without some irritation of the investing membrane. If we limit movement we may limit irritation, and therefore have less anxiety about a case when the patient is beyond our reach.

"3. It gives time for natural process of repair. It is of no value to move a tooth so rapidly that an open fissure shall develop in its wake. Therefore, for power preference would be given to the screw or wedge, or combination of screw and wedge, or screw and lever, for ease of control and convenience.

"While ingenious appliances are helpful in practice, the same results are sometimes attained by means more direct and less complicated; and in this department of practice the pressing demand is not so much for more machinery as for judgment, wisdom, and deliberation."

C. Wedl, in 1887, *Vierteljahrschrift für Zahnheilkunde,* classified the forms of irregularities of the teeth into the following nine groups: "1. Where the anterior teeth are straight or flat. 2. Where the upper and lower anterior teeth projected. 3. Where the maxillæ projected. 4. Projection of the mandible. 5. The two jaws in irregular position. 6. Anterior teeth were inclined backwards. 7. Open bite. 8. Hypertrophy of the alveolar arch and 9. Extreme overbite. The basis of this classification depended upon the position of the teeth, their size and number.

"Irregularity of the permanent teeth depended upon how far the deciduous teeth happened to be separated, although he seldom found the deciduous set of teeth irregular in position or form."

W. K. Brenizer, in the *Dental Times* on *Six-Year-Old Molars,* October, 1868, says:

"That the six-year molar, in itself, is of no more importance in the mouth at twenty-one years of age, than any other one tooth that may be as good in structure, appears to me to be a self-evident fact, and that whatever might be said of its importance to the well-being of man, might be said with equal justice of any other tooth, is equally true. Take, if you please, a perfect denture of thirty-two teeth in a mouth, with all the teeth in their places, regular and comfortable, and no signs of decay, and who that professes to be a dentist would extract the six-year molars from such a denture? and who that is less than a knave would dare to extract any one of the other teeth from that mouth? But since such dentures are the exception and not the rule to be met with it has become necessary for the well-being of his fellow-men for the dentist to be admitted into the family circle, that he may begin his observations almost at the side of the cradle.

"From the advocates of all the teeth being present, and who absolutely never extract a tooth, but in gimberjaw spread the jaw, and throw the teeth out over their already prominent neighbors, we have but two reasons given for the practice of which, if any man should fail to follow, he should be thrust out of the profession. They are, first, development of the jaw and face; and, second, the tipping forward of the tooth next to the one extracted. These two are all the reasons we have seen urged by those who advocate the absolute necessity of keeping all the teeth in the mouth. Of the evils resulting from all the teeth being present, or too many teeth being present for the jaws to accommodate comfortably, I am going to name:

"1. The irregularity of the six lower front teeth, representing something like the teeth of a saw, one tooth pointing inward, another outward, going on alternately through the six teeth, and sometimes including the bicuspids, thus making it impossible for the patient, however much disposed, to keep them clean, and eventually, through the instrumentality of the deposit of tartar, before the age of forty, and sometimes thirty years,—if the teeth are strong enough to resist decay so long—they drop out of the mouth perfectly sound teeth, and that the same result from the same cause, sometimes happens to the upper front teeth.

"2. The canine teeth, crowded outside of the arch and pressing downwards so hard as to decay the lateral incisor and first bicuspid in the effort to gain their proper place.

"3. The bicuspids, inside of the arch and completely crowded out of their place.

"4. The wisdom teeth, or dentes sapientiæ, in some one of their many abnormal positions, either facing outward toward the cheek, inward toward the tongue, or forward, leaning hard against the second molar, or imperfectly developed, with three-fourths of the face of the tooth remaining covered with gum, which is always more or less sore, and occasionally giving rise to very serious consequences, or, it may be, never developed at all for want of room to appear in. Allow me to stop just here to say that I consider these various abnormal positions that the wisdom tooth is forced to assume, in the effort to gain its proper place in the jaw, is one of the strongest points in evidence of the deterioration of the jaw in size, and that nine out of every ten of the mouths to be met with in our country in the present day, would be bettered in every way by having one tooth less on the side of each jaw.

"The injury of all the teeth by decay and eventual loss, sometimes of the most important teeth in the mouth, and the attendant expense of doctoring and plugging all the cavities caused by the pressure of one tooth upon another."

Oakley Cole, in 1868, began to write occasionally on deformities of the mouth. In that year in the *British Journal of Dental Science,* July number, we find an article of his under the title of *The Mechanical Treatment of Oral Deformities.*

In the *Monthly Review of Dental Surgery,* 1873, under *The Transmission of Hereditary Peculiarities,* Cole discusses the possibilities of transmitting dental peculiarities from one generation to another, but arrives at no definite conclusion, merely reporting six cases.

In the same journal, page 301, under *A Simple Method of Regulating Teeth,*

the same author describes the following plan to remedy the irregularity of the teeth:

"After measuring the distance across, from the most prominent part of the labial surface of the canine to the centre of the labial surface of the central incisor, cut off a stick of compressed hickory (in the round form) of the measurement obtained, split the stick in two, or cut it down till you have a half-round stem of wood, the one surface being quite flat; trim up the ends so that they do not present any sharp edges to the lip, this can be applied to the mouth or model, the two ends resting by the flat surface upon the canine and central teeth, care must be taken that free space exists between the surface of the wood and the lateral that is to be drawn forward, if the flattened surface is in contact, room may be given by filling a concavity in the wood immediately over the tooth; the wood being fitted in a satisfactory manner, a piece of gilling thread (American hemp, small size) is passed double between the central and lateral, and then passing behind the lateral tooth close to the neck, the double thread is brought out again between the lateral and canine; we have then on the labial side, the loop projecting next the central, and the two ends of the double thread projecting next the canine, while on the lingual surface we have the double thread closely embracing the neck of the lateral. If we now tie the two ends of the thread (next the canine) together so that they embrace the end of the hickory, the other end being embraced by the loop, we exert considerable pressure upon the lateral tooth; (1) by merely trying; (2) by the contraction of the thread as it becomes moistened by the saliva; and (3) by the expansion of the compressed hickory, tightening the thread still further. This appliance needs renewal twice a week, but intelligent patients can do it for themselves or their friends can do it for them.

"It is obvious that the same principle can be applied to the treatment of a great variety of irregularities, modified of course, according to the requirements of each case. At the same time I remark that its advantages over treatment by plate are considerable; (1) it is not liable to displacement; (2) the teeth can be kept clean without removing the thread and wood; (3) the progress made is easily seen and recognized both by patient and operator; (4) the pressure is continuous and not under the control of the patient; (5) it is not unsightly in appearance, and lastly; (6) it is inexpensive, so that in hospital practice many more patients can be treated than by the old method."

Cole expressed the opinion, which was held by others at that time, that the best types of English jaws made an equilateral triangle. He applied Greek names to the different classes into which he divided various types of dental arches, basing his classification on the forms of the arch. Intermaxillary prognathism he attributed to a force originating in the sphenoid bone and acting on the intermaxillary bones. Under *Deformities of the Upper Jaw: an Attempted Classification of Them,* page 103, *Transactions of the Odontological Society,* 1879-80, he classified the deformities of the maxilla into seven groups. 1. Dolichoid jaw (long). 2. Brachoid jaw (short) contracted maxillæ. 3. Macroid jaw (large and massive). 4. Microid (small). 5. Intermaxillary prognathism. 6. Intermaxillary upognathism. 7. Lamboid jaw.

"After a series of measurements and experiments that I need not now de-

scribe, I arrived at the conclusion that the triangle was the best geometrical figure for the object that I had in view, as it gave in the simplest and most diagrammatic form two at least of the measurements that were required, namely, the length and breadth of the dental arch.

"Desiring to form a triangle that should be applicable to the largest number of cases, whether edentulous or not, and capable of use with approximate accuracy to all races alike, I decide to form the base of the triangle by an imaginary line drawn from the centre of the distal surface of the second molar on each side, as near to the level of the alveolus as the third molar (if present) would admit of. By choosing the second in preference to the third molar, I disposed of the liability to error arising from abnormalities of the wisdom tooth, and at the same time was enabled to take my measurement at any period after the thirteenth year of the patient's existence.

"One other object was gained by the choice of this position, and that was that the absence of the molars on one side of the mouth did not of necessity render measurement impossible, as the centre of the distal surface corresponds very nearly with the centre of the alveolar ridge which in this region is generally well marked.

"The base being thus obtained, the remainder of the triangle was produced by lines drawn from the point of contact of the mesial surfaces of the two central incisor teeth to the extremities of the base line already referred to. This incisive point, as I shall hereafter call it, still keeps the angles of the triangle upon the central line of the alveolar ridge, so that in this respect again we measure from a point of least variation.

"We have thus formed a triangle, giving at the molars the breadth of the jaw, and by a line drawn from the apex of the triangle to the centre of the base line the length of the jaw, exclusive, of course, of the space occupied by the third molars.

"This interbicuspid measurement has always been deemed a very important one, and most writers on the deformities of the palate have referred to it.

"Contrary to the practice of some observers, I was induced to choose the second bicuspid as the best point of observation, as it corresponds with the position occupied by the second molar of the primary dentition, and is altogether the tooth subject to the least variation of position if the changes incident to the growth of the jaw be normal in character. Whilst on the other hand, given an abnormally-developed jaw, we may be tolerably certain that the second bicuspids will to some extent be affected. The interbicuspid measurement was, therefore, taken at the line of junction of the neck of the tooth with the margin of the alveolus on either side of the jaw, this position being chosen so as to avoid the inaccuracies likely to occur in the event of a largely-developed bicuspid crown.

"At a distance from the base corresponding with the distance of the second bicuspids from the distal surface of the second molar, this interbicuspid line was allowed to traverse the triangle. These lines and distances were obtained with an ordinary pair of compasses, and measured off by means of a millimeter rule. Beyond this, the height of the palate was taken, together with the total length (in the skull), and also its transverse and antero-posterior curves.

"Thus, the deformity of the palate, arising from premature ossification of the intermaxillary or palatomaxillary sutures, would of necessity invalidate the tracings and measurements of the palate, whilst abnormally large crowns to the teeth, or extreme irregularity in the crowns, would quite as obviously render comparatively valueless the data on which the triangle was constructed. Still, if these sources of error would be fully recognized and carefully allowed for, an approximately accurate diagram may be obtained.

"My observations were in the first instance directed solely with the object of ascertaining certain normal measurements, and the first set of these dimensions were taken by means of strips of lead, accurately molded to the contour of the palate in different positions, the result being immediately outlined on cardboard; the measurements were then taken off by means of compasses and a millimeter rule. It will be desirable here to give three dimensions of the palate; viz., the width, taken from the inner margin of the alveolar process opposite to the second bicuspids; the height taken from the center of the line representing the above width to the center of the palatal arch; and the length, taken horizontally from between the central incisor sockets to a vertical line let fall from the posterior nasal spine.

"The skulls examined fall into two series: first, thirty-four adult skulls of European origin; and secondly, thirty-two adult skulls of mixed races. In the first series the average length was 49 millimeters (maximum 58 m., minimum 40 m.); the average width was 35 m. (maximum 42 m., minimum 31 m.); the average height was 9 m. (maximum 15 m., minimum 5.5 m.). In the second series the average length was 54 m. (maximum 65 m., minimum 43 m.); the average width 35 m. (maximum 40 m., minimum 29 m.); the average height was 12 m. (maximum 18 m., minimum 6 m.).

"Beyond the dimensions just enumerated, I obtained with the compasses the dental triangle to which I have already directed attention. The first set of observations having special reference to the palate, and the second to the alveolar and dental arches.

"Two main facts are deducible from the data obtained in the second instance; first: that the best type of well-developed English jaw will give an equilateral triangle as the result of measurements taken in the way I have described. Secondly: that the interbicuspid line will fall upon the triangle some five-tenths in the perpendicular from the base line, and that the extremities of the interbicuspid line will pass well beyond the boundary of the triangle on either side.

"In regard to the prognathous and upognathous jaws, we are in a somewhat more satisfactory position, and although I would not presume to speak with authority, yet I trust I may be able to put forward a case with such a show of reason as shall at least command further and patient investigation.

"My first assertion is this, that the deformity known as intermaxillary prognathism is the result of a force operating on the intermaxillary bone, such force originating in the body of the sphenoid, and being transmitted by the intervening nasal septum. (I may at once say that when speaking of force I mean a direction of growth in a given line of such energy as to overcome the resistance offered to it by surrounding structures.)

"The foregoing assertion is based upon the interpretation of the following observed facts: First, the true case of intermaxillary prognathism will have a long thin nose. Secondly, this long thin nose is not observable during the first dentition, nor is the prognathism, excepting to a very slight degree indeed. Hence we may conclude that the long thin nose and prognathous jaw are capable of intensification by growth and development during early life. Thirdly, it has been shown that the measurement from the interbicuspid line to the incisive angle is greater in the prognathous than in the normal jaw; hence it follows that the change from the normal arch occurs at a point anterior to the second bicuspids, whilst the second bicuspids are known to correspond with the position of the second molars of the milk dentition. Thus it is shown that the prognathism is not of the whole jaw carried forward on a horizontal plane,

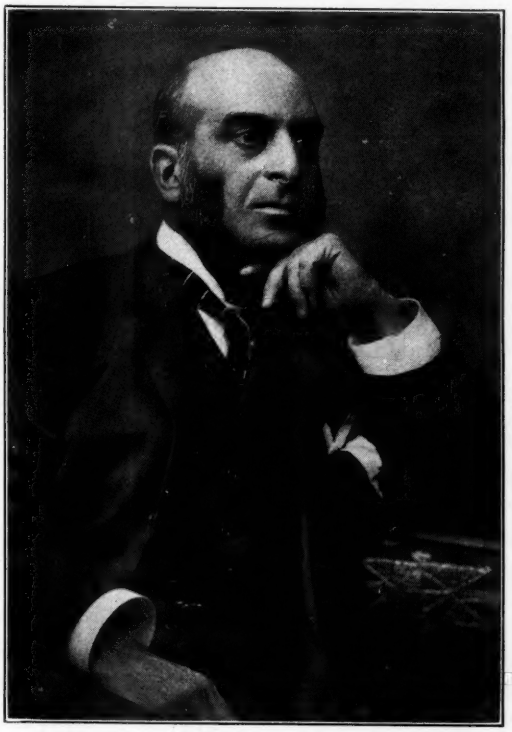

Fig. 2.—Henry Sewill.

but is really intermaxillary or alveolo-sub-nasal in its character. Fourthly, it is simple, logical sequence of the process that produces intermaxillary prognathism, carried a step further during embryonic life, that produces double hare-lip and fissured alveolus."

Henry Sewill, on *Irregularities and Diseases of the Teeth,* 1870. A series of papers from *The Lancet* and *British Journal of Dental Science,* London, 1869, states: "Irregularities due to malformation of the jaw are now to be considered. In the recognition of these cases the point of greatest value obviously is a knowledge of the exact form of a well-shaped maxillary arch. The anterior portion of this arch, containing the incisors, canines, and bicuspids, forms an almost perfect semicircle, whilst those portions containing the molars

continue the arch backwards in slightly curved and divergent lines. Flattening or contraction of this arch, or abnormal development of any portion of it, give rise to irregularities of the teeth.

"This class of irregularities is most frequently congenital, and at the same time hereditary, a peculiar abnormality of the jaw being, in this manner, reproduced in many members of a large family. They may, however, be due to injury or other accidental causes.

"The V-shaped or contracted arch, instances of which daily present themselves, give rise to endless varieties of displacements of the teeth. The incisors and bicuspids are often forced inwards, the canines generally in the contrary direction; so that an irregularity exceedingly damaging to the expression of the countenance is the result.

"The distinction between the first and second classes of irregularity is rendered manifest by these examples, and nothing would be gained, did space allow, by multiplying them. It is evident that little can be done by the surgeon in the second class. In the treatment of this variety, it is necessary in the first place, to consider the desirability of extracting teeth for the sake of obtaining space. Secondly, where teeth must be sacrificed, it is necessary to decide which of them can be removed with the greatest advantage. Next comes the question of the extraction of such malplaced teeth as are not amenable to mechanical treatment. Lastly, there is the designing and construction of the mechanical apparatus required for the completion of the cure. With the many details here involved, none but those who make dentistry a special study, can be expected to be practically acquainted, and these cases must, therefore, be considered almost altogether beyond the province of the medical practitioner.

"A few remarks on the mechanical treatment of irregularities may be added in conclusion. They will be of service in determining the cases which are capable of being either improved or cured by the application of apparatus.

"Instruments for the purpose of altering the position of malplaced teeth are constructed to fulfill two objects: to prevent the locking together of the teeth on closure of the mouth, and to exert such continued pressure or traction on those teeth which are irregular that they may be gradually compelled to assume a normal position. To fulfill these objects, a plate of metal or of vulcanized india-rubber is accurately adapted to the teeth and palate, the molars being covered with sufficient thickness to prevent the front teeth from meeting. A fixed point is thus formed, to which springs or levers, elastic bands or wedges of wood, may be attached in any desired situation. These may be arranged to exert, with great nicety, any amount of force required, and to effect the desired result without exciting unnecessary inflammation.

"This was an irregularity of the first class, one lateral incisor being displaced inwards, and held in its malposition by the lower teeth on closure of the mouth. The plate covering the molars kept the jaws sufficiently apart to prevent the front teeth from meeting. The obstacle to the forward movement of the tooth being thus removed, but a slight amount of pressure was required to force it into its normal position. To obtain this pressure a piece of compressed hickory was fixed between the plate and the back of the tooth. The moisture of the

mouth caused the wood to expand, and in expanding, to drive the tooth slowly in the desired direction. The wood was renewed by larger pieces at intervals of a day or two, as the cure progressed, until at length, the teeth have assumed the regular appearance.

"This case is of a different character. It consisted of a vulcanite frame, closely in contact with the inverted angles of the teeth, but clear of the rest of their surfaces. From each side of this frame there proceeded a flat spring of hard gold wire, and these, extending round in front, were arranged so that their free extremities kept up constant pressure on the everted sides of the irregular teeth. By this means the distorted incisors were compelled gradually to revolve, and in a comparatively short time the deformity was entirely removed.

"By similar contrivances the alveolar border, and even the whole jaw, may, when necessary, be modified in form. For instance, in the contracted or V-shaped palate, an apparatus would be made to maintain equal pressure from within outwards along the alveolar margin. In time the required expansion of the arch would be accomplished.

Fig. 3.

"Other cases may be advantageously dealt with by instruments fixed externally. Thus the case would be treated by a constant upward traction of the chin, a cap of leather adapted to that part being attached to a strap across the head by strong elastic bands at each side.

"This apparatus and its application are shown in Fig. 3.

"The almost marvellous manner in which the jaws may be modified in shape by the continued application of force in one direction, is not uncommonly illustrated in surgical cases. The sequel of extensive burns of the front of the neck furnishes, occasionally, an instance in point. The cicatrix resulting from such injury has a constant tendency to contract. It draws the chin unceasingly toward the chest, and in time causes the body of the jaw to curve downwards.

"From a consideration of the principles upon which the mechanical treatment of irregularities is based, it will probably suggest itself that this treatment can be much more rapidly and effectually carried out in the child than in the adult. At the age at which the alveoli are in process of growth, and when they do not closely embrace the teeth, a malplaced tooth can be drawn into position in

a short time, and with the exercise of but slight force; whereas in the adult, the bone being consolidated, the process is long and tedious. For the same reasons, the cases in which the shape of the jaw has to be modified are much more amenable to treatment at an early age than at a later period, when the osseous system is fully developed. If, therefore, the opinion be formed that the treatment of a case of irregularity can not be undertaken without mechanical aid, no time should be lost in the construction and application of the necessary apparatus."

D. Hepburn before the Odonto-Chirurgical Society, published in the *British Journal of Dental Science,* page 264, on *Irregularities of the Teeth and Their Treatment,* said: "In order to simplify the subject for which purposes of dis-

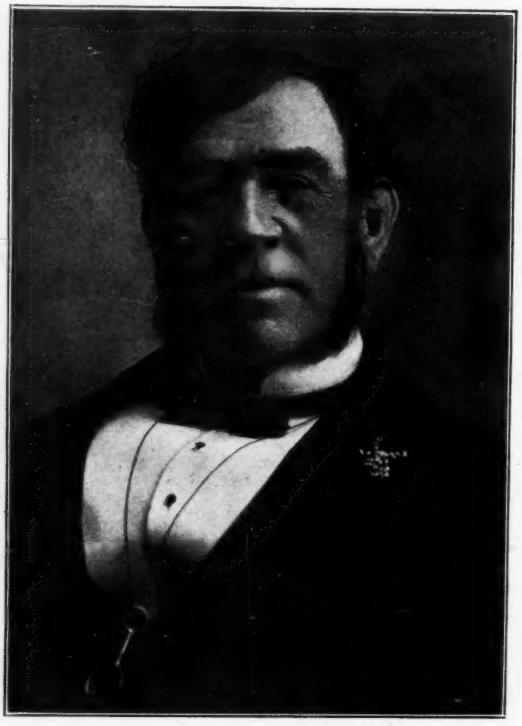

Fig. 4.—D. Hepburn.

cussion I have arranged it under three heads; viz., the cause, treatment, and the instruments made use of for the cure of these deformities.

"It seems to be generally accepted as a fact, that this particular deformity is the result of the artificial life and the other causes attendant upon civilization.

"I shall only call your attention to one more theory in which it is affirmed that the premature extraction of the temporary teeth permanently contracts the jaw, while I do not for a moment suppose that any positive contraction of the jaw or alveoli takes place.

"Independently of those influences, the action of which is doubtful, and there are causes familiar to us all, which are at once active and direct in their effects upon the developing teeth, such as the presence of supernumerary teeth, the nonabsorption of the roots, and retention of the temporary ones, the

irregular antagonism of the upper and lower sets on closing the jaws, etc. We have also those of hereditary character, as exhibited in such cases as are marked by the absence of certain teeth in some families, or by the peculiar formation or malposition of one or more in others, the origin of these conditions being as obscure as some of which we have been treating.

"For the reduction of this deformity there are two lines of treatment usually followed, the surgical and mechanical, though in many cases it is found necessary to take recourse to both.

"In undertaking the treatment of these cases we have to consider the form of palate, whether it be of a hereditary character and is the result of a defective or undue development of the jaws or alveoli, or whether the deformity simply arises from malposition in the teeth themselves, or whether we shall treat them at all, must very much depend on these conditions. If arising from the former, the cure may even, if successful, assume a long and protracted character, if from the latter, it is usually of a more simple kind, and more readily mastered.

"Before doing so, however, I should wish briefly to state what I consider to be essential characteristics of regulating frame. While it is absurd to say that any particular form of instrument was the best for all cases, there are nevertheless certain points which ought to be possessed by all, if we hope to make use of them with effect. In the first place they ought to be as simple as possible in their construction, and free from all complications. There action ought to be at once decided, continuous and direct, without being harsh; they should be as small and as light as we can make them, consistent with the purposes they have to fulfil, when in position they ought to be fixed and steady, so that we may have a reliable foundation on which to work and to which we can attach our clasps, springs or other moving powers; any rotary or motion will at once interfere with their action and delay the progress of the cure. I think it also essential that the patient should be able to take them out and replace them at pleasure; this enables them to keep the mouth clean, and lessens risk of injury to the other teeth from the food or morbid secretions of the mouth accumulating about the frame. We must all have seen frames which have been tied in, come back in the most offensive state, for this and other reasons I object to the use of ligatures, which are not only apt to irritate and inflame the gums, but as has been clearly demonstrated by the valuable experiments of Mr. Bridgemen, they excite an electrolytic action, which decalcifies the enamel, and is most destructive to the teeth around which they are tied.

"An ingenious application of the principle of the inclined plane has been illustrated by Mr. Fletcher, in a paper read before the Odontological Society, in which he says: 'A modification of these plans I made use of some years since, in this I capped with gold the back teeth of the under jaw, uniting the caps on both sides of the mouth by a narrow, stout, gold band, passing in front and resting against the anterior teeth, to the buccal sides of the caps; to the side of the first molar was soldered a stout piece of gold plate, projecting upwards about half an inch, cut at about an angle of sixty degrees, sloping upwards from the bicuspid to a parallel line from the middle of the molar. The upper

plate was made capping the back teeth and covering a portion of the lingual surfaces of the anterior teeth. A small thick piece of gold was soldered to the buccal sides of the caps, into which was screwed a strong gold pin, which on any effort to close the mouth, rubbed against the inclined edge of the under piece forcing the under jaw back. As the caps came into contact the points were filed away until the teeth themselves nearly met. In the course of about three weeks the under teeth were, on closing the mouth when the apparatus was out, fully one-eighth of an inch within the upper, being previously more than double that distance beyond the upper teeth. This I adopted in preference to the strap on the chin and strong elastic bands carried to the back of the head, which I found considerably increased the inconvenience to the patient and was much less effective in operation.

"The frame which I am in the habit of making use of is simply one of these covering the palate and crowns of the teeth, with the addition of metal clasps which passes over the cutting edge and labial surface of one or more of them, its position depending upon the character of the case, and the teeth to be operated on; it is to these clasps that I wish to call your attention, as it is this which gives the distinctive character to this frame, and it is surprising the uses, and variety of cases to which it can be adapted.

"Its primary object in cases of instanding teeth is to sustain the frame firmly in its place, but it also acts with the plugs and the teeth to be moved, thus by a double action assisting in the cure.

"In cases of outstanding teeth it is made to overlap them, and by its simple action it gradually, but surely, presses the offending teeth into the desired circle; as they move the clasps are tightened, which, in many cases, may be done by the patients themselves.

"In cases of torsion it is made to press upon the outstanding labial angle of the tooth, while a plug of wood acts upon its inner palatal angle; the plug is lengthened and the clasp is tightened as the teeth move around, which they gradually do under their combination action during mastication, etc."

John Hugh McQuillen, 1826-79, in the *Dental Cosmos* of 1871, page 513, under *Influence Exerted by Antagonizing Teeth in the Maintenance of Dental Irregularities,* says: "The influence exercised by the lower incisors in maintaining a false position of the superior incisors, when the latter strike inside of the former, has been noticed by everyone who has paid any attention to the subject; and the fact is fully recognized that the first indication in attempting to correct the difficulty is to prevent the unnatural occlusion, as all efforts to bring them into their proper position would otherwise prove unavailing.

"Judging from some cases, however, that have come under my observation, in which efforts have been made to correct a malposition of the superior canines by extracting the neighboring bicuspids, it would seem that the direction and influence of the force exerted by the inferior antagonizing bicuspids had not been sufficiently considered, or perhaps not even thought of.

"For instance, when the superior canines project outside of the arch, not unlike tusks, and the other teeth are very much crowded owing to the small size of the jaws, it was formerly the invariable practice to extract the neighbor-

ing bicuspids to secure sufficient room for the canine to fall into position. In many cases this course was not only unwarrantable but decidedly reprehensible practice, from the fact that valuable teeth were frequently and uselessly sacrificed. This has been proved by the introduction of improved appliances for enlarging the arch in other cases, gaining thereby sufficient room for the canines to fall into proper position without the loss of a single bicuspid.

"In some instances, however, the necessity of sacrificing the bicuspids is imperative, and it is to just such cases that attention is now invited, as it becomes a matter of question frequently under such circumstances to decide whether the first or second bicuspids should be removed to secure desired room. The usual practice advised and followed is to extract the second bicuspids, under the impression that ample room can be obtained, and without a V-shaped

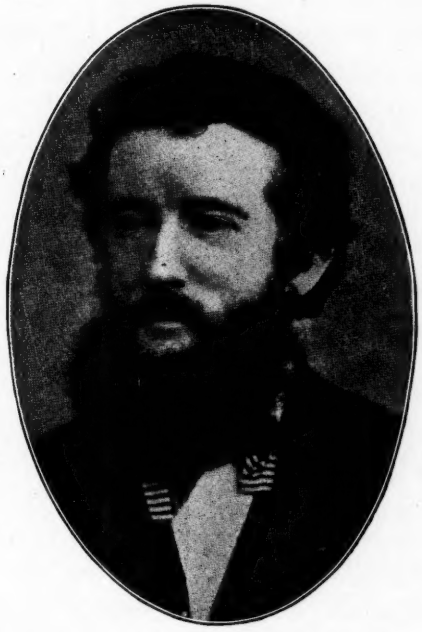

Fig. 5.—John Hugh McQuillen (1826-79).

space (with the base toward the gum, favoring the retention of food) being formed between the canine and second bicuspid, as, is asserted, is apt to be the case after the removal of the first bicuspids.

"On examining the articulation of a perfect and regular set of natural teeth, it will be found that the teeth of the upper and lower jaw are arranged in such a manner that, owing to the difference in size, the superior incisors and canines, when the jaws are closed, lap over the upper third of the anterior surface of the inferior incisors, canines and half of the first bicuspids, while the crowns of the first superior bicuspids antagonize with the posterior half of the first and the anterior half of the second inferior bicuspids. This peculiar antagonism of the crowns of the bicuspids is continued to the molars, so that 'no two teeth oppose each other only, but each tooth, in closing the jaws, impinges upon two; so that, should a tooth be lost, or even two alternate teeth,

still the corresponding teeth of the opposite jaw are to some extent opposed, and thus remain useful. For when a tooth is wholly unopposed, a process is set up in the jaw by which the useless organ is gradually ejected.'

"This order of antagonism is, of course, materially modified in irregular dentures, particularly when the superior canines are outside of the arch, and the first bicuspids are in close proximity to the lateral incisors. In such a state of affairs the inferior first bicuspids will be found impinging on the posterior half of the first and the anterior half of the second superior bicuspids, and, as in closing the lower jaw, the direction of the force being upward and forward, the shock of occlusion tends to maintain the irregularity, even after the removal of the second bicuspids. The influence of this shock can be properly estimated by referring to cases where bicuspids or molars have been driven into the most peculiar positions, after the loss of adjoining teeth, by the direction of the force exerted by the antagonizing organs.

"The importance of taking this matter into consideration in deciding upon the question must be conceded, and where the occlusion of the bicuspids is such as to maintain the irregularity by driving the first superior bicuspid forward, those teeth should be removed in preference to the second bicuspids."

Before the Odontographic Society of Pennsylvania, *Dental Cosmos,* 1872, page 604, Dr. McQuillen, in discussing a paper, said: "It was difficult to form an opinion as to what plan of treatment would be the best to adopt in treating a case of irregularity of the teeth, when the conclusion had to be arrived at merely from an examination of plaster models. An inspection of the mouth and a view of the features of the patient, in person, or by means of a photograph, was a necessary aid in forming a correct diagnosis. He had frequently been consulted by fellow-practitioners residing at a distance, who had sent plaster models by mail, but none of them had ever thought of forwarding photographs of patients. The age of the patient, the laxity or density of the tissues, the constitutional peculiarities, were points on which one should be informed and this could be best acquired by personal interview. With these drawbacks he would suggest the introduction of a piece of hickorywood between the superior laterals to act as a wedge and force them past the central incisors, and then would use the silver bar and rubber ligatures, as proposed by him in 1859, in the *Dental Cosmos,* Vol. 1, page 183, the ligatures being attached to the laterals, so as to draw them into their proper position in the arch. During all this time an inclined plane made of hard rubber and fitted to the lower teeth would materially aid in forcing the laterals in their position."

J. Langdon Down, 1871. Odontological Society of Great Britain, 1872, *On the Relation of the Teeth and Mouth to Mental Development,* wrote: "The excessive vaulting of palate is due to the arrest of development of the sphenoid or defective growth of vomer. They are developmental defects and are caused long before the time when nursing is practiced, unless that habit be an intrauterine one.

"A marked character of the teeth of idiots is their irregularity as to position. They are often crowded, so crowded as to present their sides instead of their anterior surfaces. They are often arranged on different planes. The

canine teeth are frequently unduly prominent, and a marked sulcus is sometimes seen between the incisors and canines, with prominence of the incisors. . . .

"Of the most significant value, however, is the condition of the palate. I have made a very large number of careful measurements of the mouths of the congenitally feeble-minded and of intelligent persons of the same age, with the result of indicating, with some few exceptions, a markedly diminished width between the posterior bicuspids of the two sides. . . .

"One result, or rather accompaniment, of this narrowing is the inordinate vaulting of the palate. The palate assumes a rooflike form. The vaulting is not simply apparent from the approximation of the two sides; it is absolute, the line of junction between the palatal bones occupying a higher plane. Often there is an anteroposterior sulcus corresponding to the line of approximation of the two bones. . . .

"An appeal to the condition of the mouth is an important aid in determining whether the lesion on which the mental weakness depends is of intrauterine

Fig. 6.—Langsdorff's method of rotating teeth (1863). (Magetot.)

or postuterine origin. In the event of the mouth being abnormal, it indicates a congenital origin; while if the mouth be well formed, and the teeth in a healthy condition, it would lead to the opinion that the calamity had occurred subsequently to embryonic life."

A. H. Fuller, in the *Missouri Dental Journal,* 1872, published a new method of making a coil wire band, describing his method in the following way: "In 'regulating cases,' having at times found it extremely difficult to perfectly fit a band to a tooth which I desired to twist, it occurred to me that the difficulty could be overcome in the manner which I will describe and which I have since found of great advantage, saving time and patience, and giving a more accurate adaptation than could be obtained by any other method with which I am acquainted.

"I take an impression of the tooth, from which I get a plaster model; around this I wind a fine platinum wire, one coil above the other, until a band of sufficient width is formed. Over this, and while yet on the plaster model, flow gold solder, and you will have a perfect fitting band. Attach your catches at whatever points on the band you wish to apply your force by solder-

ing on a small piece of plate, or in any manner the case may suggest to your mind as the best.

"Clasps can be perfectly fitted to teeth in this manner, using heavier wire and twenty carat gold for solder, cutting the band so as to clasp the tooth in the proper manner."

Thomas C. Stellwagen, before the Odontographic Society of Pennsylvania, in discussing a paper reported in the *Dental Cosmos,* page 605, 1872, saying: "Study the patient's features both full face and profile, noting any defects that may be apparent. Many times protracted suffering, and even serious injury, may be avoided by remembering that it is unnecessary to expand the alveolar arch simply to get the whole of the teeth in position, where it is large enough to harmonize with the face and does not impair the voice or mastication.

"While it is questionable or even bad practice to preserve useless teeth, always remember that it is rare that any of the six anterior teeth can be removed without serious deformity resulting from the loss. The first or second bicuspids from their liability to disease, their secondary importance in speech, expression, or mastication, and, finally the spaces left after their extraction, being so easily filled and so frequently sufficient for the purposes of the orthodontist, are all sufficient arguments for the sacrifice of these organs in preference to others.

"The occlusion of the teeth, the manner in which they tend to interfere with the movement of each other, also the proposed occlusion to be gained after the treatment has been completed, should be taken into account.

"The occlusion of the teeth has more to do with their moving than any power that could be produced either with a plate or ligatures."

Wm. A. Breen, in the same journal, said he "had a case similar to the one under consideration. He used whalebone in place of wood, as suggested by Prof. McQuillen, and then used an incline plane upon the laterals until they were forced between the cuspids and centrals; then removed the plate, and allowed them to fall into the arch of their own accord, which they did very satisfactorily."

Robert Baume, in *Vierteljahrsschrift, für Zahnheilkunde,* 1872-73, and translated in the *Monthly Review of Dental Surgery,* Vol. 2, has a series of articles on the *Eruption of the Teeth.* He takes exception to the theories of Wedl and Tomes but adds little that is really new.

J. T. Browne-Mason, on the *Irregularities of the Teeth,* published in the *Transactions of the Odontological Society of Great Britain,* page 161, 1872, treated the subject in the following manner. He divided the subject into two heads: "First, the treatment of cases not requiring mechanical appliances; secondly, cases that need such aid.

"The first-named cases are frequently the result of the crowding of the teeth by pressure forwards of the back teeth.

"With regard to the treatment of irregularities caused by insufficiency of room. To get the offending teeth into the dental arch, it is clear that we can only make room for them by the withdrawal of others.

"The bicuspids, unless their space has been lost by the early removal of

the milk molars, find their way into their normal places without much trouble, for their predecessors leave them abundance of room. Should they, however, be pushed out of place, I should not hesitate to remove the bicuspid, for its room would, under the circumstances, be an advantage.

"The canines are very frequently thrust out of the dental arch by want of room.

"My mode of procedure is to leave the six front teeth intact, and sacrifice a bicuspid, or first molar, on each side. Which of the two is to be the tooth sacrified must depend on circumstances.

"Now, with regard to the treatment by mechanical aid. I find the cases in which the lower jaw requires such assistance so rare that I can not give any examples of it, for I have almost invariably found that when there is sufficient room in the lower jaw the teeth will arrange themselves.

"You will find that most of the irregularities of the lower jaw will be reduced by nature, provided, as before said, there is room in the jaw.

"Our model being taken, the tooth or teeth must be turned and corrected on it, and then a plate fitted accurately round the inside of the incisors, coming quite to the inner edge of these teeth, capping the temporary molars, and extending back over the masticating surface of the permanent first molars, to prevent these teeth rising in the jaws whilst the plate is worn, which would interfere with the bite when the plate is left off. The caps must go well under the gum of the temporary molars, so as to firmly grip the necks of these teeth, otherwise the plate will not be perfectly steady, but apt to slip: there should be a piece of plate to thicken the caps over the grinding surfaces, and this thickening should be considerable over the first temporary molar, and less over the second temporary molar, ceasing with that tooth. If this extra thickness is not placed on the caps, you will find, when the plate is in the mouth and the mouth closed, there will be no bite except on the last teeth on each side, and the patient would then have difficulty in masticating whilst the plate is worn. I like to have the bearing hard on the first milk molar, and if found too hard on that tooth a sharp sculptor will soon remove the points borne on, for after our plate is in its place, as will presently be seen, it should not have to be removed for some time. A bar must also be carried from first molar to first molar, fitting close to the outside of the central teeth, to keep them steady when turned. When the plate is ready, I seize the tooth or teeth with a pair of forceps, like a pair of broad, flat pliers, the biting surface of the jaws of the instrument being covered with lint or chamois-leather, to prevent injury to the enamel of the teeth. Then, with a steady twist I revolve the offending tooth or teeth in their sockets, and immediately place on the plate, and the work is done. I have never seen any unpleasant effects from the torsion in this way, the pulp not being injured by the process.

"Case No. II. I fit a plate as already described, only without tampering with the cast in any way, a screw being brought to bear on the teeth that require correction at about the point where the disto-lateral and lingual surfaces of the tooth form their junction, whilst a rigid bar is carried round from the first molar to determine the degree of prominence, in order that the teeth may

not, by the pressure of the screw, be thrust too far out, but, by the restraining action of the bar, be revolved on their own axes when the desired prominence is gained. The screw should be turned every morning and evening if practicable, until as much pressure is produced as the patient can bear; if necessary, the advancing tooth must be followed by building up plate behind it, a fresh screw being inserted as required. By this means, in nine visits, extending over seven days, a complete correction was made of the offending teeth in the case before you. After the teeth are in position, I take a fresh cast, and adjust my plate and bar to retain the teeth in their places; the apparatus is then worn by the patient for four to six months, to ensure the teeth retaining their new positions, the hold of the caps having been slackened to allow the patient to remove the plate for the purpose of cleansing it and the teeth. (See Fig. 7.)

"I prefer the use of the screw to compressed wood, for the latter I found occasionally slip out of position, besides being much slower in operation; and I have a great preference for speedily finishing such cases, as it must necessarily be less trying to the patient, whilst the permanence of the work is not affected by it. I also think the screw more desirable for bringing teeth for-

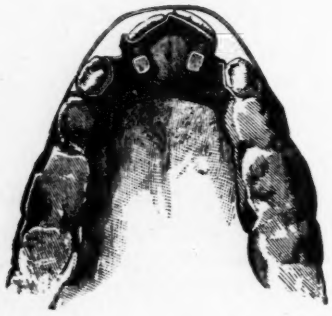

Fig. 7.

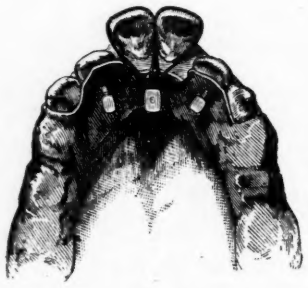

Fig. 8.

ward than the inclined plane placed on the lower teeth; for, by the latter plan, the patient has constant worry, and more especially during meals. From the molar teeth having no bearing, all mastication during the period of the moving the teeth being perforce most imperfect, and the discomfort, to say the least, at those times of the teeth under treatment, tender as they are, striking on the inclined plane, is, I think, much more trying than the pressure of the screw, which only causes discomfort and pain at the time it is moved. Actual torsion should be performed as early as practicable before the root of the tooth has completed its growth. (See Fig. 8.)

"Plate of either gold or dental alloy is more manageable than vulcanite, as it is easier to follow up advantages gained by building up plate than by taking a fresh cast, and by making almost a new frame when the changes of the mouth require it."

L. Fleschmall, in *Wiener Med. Wochenschrift* (*Dental Cosmos,* 1873, page 261), under *Irregularity of Teething Diagnostic of Rhachitis,* calls attention to how seldom this subject is alluded to and claims rhachitis can be hereditary or acquired. It is with the latter class that the author has to do, and it is

the most frequent form, affecting nearly one-third of all children. Rhachitis is due to a peculiar disturbance of nutrition in a growing body, a "dystrophy," amenable with more or less success to treatment at the beginning. Children nourished artificially are, for obvious reasons, more liable to it than those brought up at the breast, and the latter, when affected are generally so after weaning; that is, after the tenth or twelfth month.

"The teeth come first in the order of the bones affected, and the disturbances, therefore, in the ossification of the teeth can serve as a valuable sign of a very important disease. The formation of the embryo of a tooth commences in the second month of foetal life, and in the middle of the third month is completed for all the teeth. The milk-teeth are formed in the fifth month, and are so far advanced at birth that the crowns of the incisors and first molars are completely developed; those of the canine and posterior molars one-third formed. As the acquired rhachitis, according to experience, rarely comes on before the end of the sixth month, and most frequently in the latter part of the first year, reaching its highest point between the second and third years, it follows that, if we place the appearance of the first teeth at the seventh month, the rhachitic process will not have had any influence upon these. The only exceptions to this are when a hereditary rhachitis makes rapid progress immediately after birth, or when the infant is weaned very early, and is brought up with improper food; in such cases it happens sometimes that one waits in vain for the appearance of the first teeth and sees a year or more elapse. In the majority of cases rhachitis shows itself first after the breaking through of the first molars."

Joseph Richardson, before the Odontological Society of Pennsylvania (*Dental Cosmos,* 1873, page 350), in a paper *Treatment of a Case of Irregularity,* explained the following method of handling these cases, first extracting the first bicuspid and then a narrow band of vulcanized rubber (Fig. 10) was constructed embracing the six anterior teeth. "Pressure was made upon the misplaced teeth by means of wooden pegs inserted in holes drilled through the band, at such points as were indicated by the direction in which it was desired the teeth should take. In the present case the pegs rested against the posterior mesial angles of the lateral incisors in such a way as to force them, when the band was applied, outward and backward, while those inserted into the opposite or labial portion of the band carried the cuspidati backward and inward. These pegs projected but slightly at first, and were lengthened from time to time, as the teeth moved, their removal and replacement being but the work of a few minutes. Before applying the band, all connecting partitions of rubber were divided, and the band cut away sufficiently at necessary points to enable the teeth to move in the desired direction. In most cases this band may be removed and replaced by the patient for the purpose of cleansing the teeth.

"The mechanical action of this simple fixture is readily apparent. The band, when applied, being forced apart by the intervention of the pegs, acts, by virtue of its elasticity, as a clamp, or compressor, forcing the teeth in a direction opposite the insertion of the wooden pins.

"I found the case now complicated with a marked elongation of the lateral incisors.

"Without any published precedent, so far as I am aware, I entered upon the novel undertaking of shortening (relatively) the elongated teeth in question, by pressure applied on a line with their long axes. To this end, a plate affording fixed points of resistance was constructed, having clasps attached and pinned to the centrals with wooden pegs resting against their anterior, and the plate against their posterior surfaces. To this plate firm elastic cords were attached, stretching across the openings for the lateral incisors. When this plate was pressed firmly to its place upon the teeth, and held securely by the means already adverted to, the contractile force of the cords, acting forcibly and persistently upon the cutting edges of these teeth produced the requisite short-

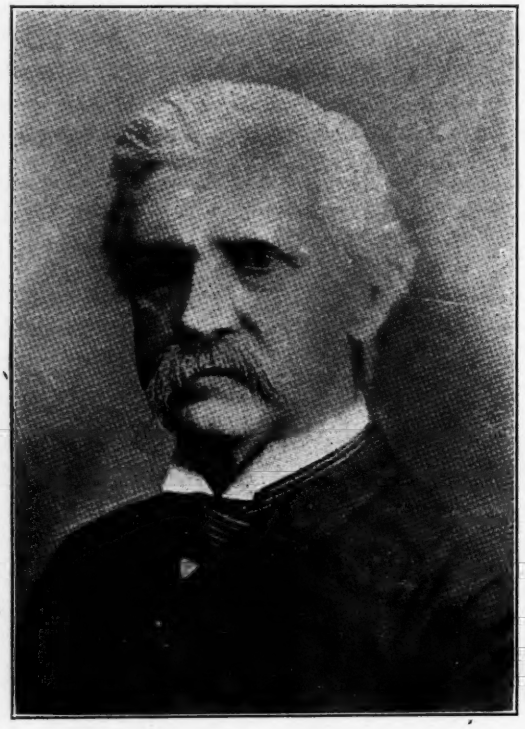

Fig. 9.—Joseph Richardson.

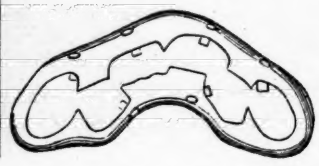

Fig. 10.

ening. During this time pressure was also being made upon the cuspids, which, in addition to forcing them further backward and inward, assisted in fixing the plate in aid of the shortening process.

"Finally, a plate was made, resting accurately against the posterior faces of the central and lateral incisors, and cut away somewhat posteriorly to the cuspids, to enable the latter to drop down until they shall become symmetrical in length with the adjoining teeth."

D. F. Drake, before the American Dental Convention, 1873, read an essay on *Orthodontia,* saying that "he thought that orthodontia meant something more than the mere application of appliances to the teeth to throw them into

their proper position. The conditions to be desired are: (1) Youth or proper age; (2) health of the parts; (3) absence of syphilitic taint, hereditary or otherwise; (4) absence of scrofula or struma; (5) absence of all scorbutic tendencies; (6) absolute cleanliness; (7) confidence of patient. All these things being conditions favorable, success is certain. Remember that the simplest method is always preferable. With the appliances nicely adjusted and carefully watched, the carrying of the teeth to their proper position is an easy matter. This must be done neither too fast nor too slow, for either will jeopardize the operation. There is little danger of moving too fast if it is done steadily. A steady, firm pressure will provoke much less inflammation than an unsteady, oscillating movement. Move the teeth as fast as it is possible without injuring

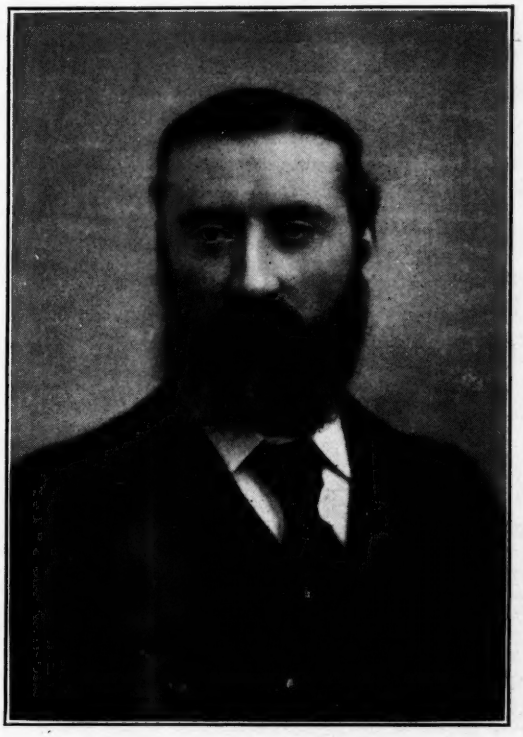

Fig. 11.—Charles S. Tomes.

the pulp. It is quite common for children to inherit large teeth from one parent and small maxillæ from the other. In such a case an enlargement of the maxillæ must be obtained, but not until the majority of the second teeth have made their appearance. This contraction of the maxillæ is almost invariably associated with irregularities of the teeth."

Charles S. Tomes, in the *Dental Cosmos,* 1873, page 292, in an address before the Philadelphia Dental College on *The Bearing of the Development of the Jaws on Irregularities,* stated: "Teeth when they are erupted *do not come down and take their places in a bone already prepared for them;* on the contrary, that which is there to start with is absorbed, and the bone in which they are ultimately implanted is built up *around them, no matter what position they*

may assume subsequently to their eruption. And the inference to be drawn from these facts is tolerably obvious; namely, that premature extraction or the temporary extraction of the temporary teeth is perfectly unable to be the cause of contraction of the jaw. For, unless the bony bar which lies below our imaginary line be distorted, it matters very little indeed what happens above it, so long as the permanent teeth meet with no obstruction during their exit from their cysts.

"Now the case is very instructive, for it shows very plainly that contraction of the jaw is by no means a necessary sequence of early removal of deciduous teeth, but that on the contrary, every single one may be removed, and yet the jaw become of full size and the teeeth be arranged with perfect regularity.

"Along the outside of the dental arch the muscular structures of the lips and cheeks are perpetually exercising pressure perfectly symmetrically, and on the inside the tongue is with equal persistency doing the same thing. Now if we imagine a plastic material placed between the tongue and the lips, it can not fail to be molded into the form of a regular dental arch, and this is precisely what happens with the mobile, freshly erupted teeth; and should it chance that an individual tooth becomes deflected by some obstruction, so that it stands outside or inside its neighbors, it will obviously come in for more than its due share of pressure, and so soon as the obstruction is removed, will be pushed into place. And as the muscular action of the tongue is more powerful than that of the lips, a tooth which stands inside the arch is reduced to its proper position more quickly than one which lies outside. There is, I believe, no such thing as a natural tendency towards the assumption of the regular form in a dental arch; the physical forces at work, namely, the lips and tongue, are amply sufficient to account for all the phenomena observed; and explanations based upon such a tendency fall, like references to 'vital force' as an explanation of physiologic phenomena, into the category of mere forms of words calculated to cloak our real ignorance.

"Certain cases known as V-shaped contracted jaws likewise illustrate the power of the pressure of the lips and cheek to modify the position of the teeth, for it will generally be found that this malformation is associated with greatly enlarged tonsils, which necessitate breathing being carried on with the mouth open. Now, as every one can easily verify upon himself, the effect of the mouth being held open is to increase the tension of the soft parts about its angles, and the result of the increased pressure is to bring about a bending inwards at the corresponding point; i. e., the bicuspid region. At the same time, the median portion of the arch escapes the controlling pressure which would have been exercised by closed lips, and the effect of this is traceable in the excessive prominence of the median pair of incisors, and also in their oblique positions, which makes them correspond with the form assumed by the inner surface of the lips when the mouth is open.

"The association of this form of contracted jaw with congenital idiocy, as well as some other considerations, lead me to infer that the contraction of the face of the jaw is due to causes in operation from a very early period; but the

agency of the lips and tongue is that which determines the position of the teeth themselves."

In the *British Journal of Dental Science,* May, 1873, page 200, in describing *A Case of V-shaped Contracted Maxilla, in Which There Was a Wide Separation Between the Upper and Lower Front Teeth,* Dr. Tomes said: "Mouths in which the back teeth alone antagonize, and the upper and lower front teeth fall short of meeting one another, are not very uncommon.

"The upper jaw presented the ordinary form of a V-shaped maxilla, the central incisors meeting one another at an angle, their mesial edges being greatly everted and overlapping one another, and the palate being excessively deep and narrow. When the mouth was closed to the utmost extent possible, a gap of $\frac{4}{16}$ of an inch intervened between the edges of the upper and lower central incisors, of $\frac{3}{16}$ between the right laterals and the canines, and of $\frac{2}{16}$ between the left laterals, while the left canines occupied a position (relatively one to another) too irregular to admit of exact measurement. Behind the canines the upper and lower teeth came in contact with one another, but their disposition was very irregular. Thus the second upper bicuspid (the first having been previously removed) bit inside the corresponding lower tooth; whilst of all the teeth in the upper jaw the second molars were the only ones which preserved their normal relations by biting outside the corresponding lower teeth. It was therefore necessary to move outwards the central and lateral incisors, the canines, and the second bicuspids on both sides. The first stage in the treatment was to expand the arch of the upper teeth.

"The first upper molars, being excessively carious, and often painful, were extracted, and a vulcanite plate was then inserted, which forced the bicuspids outwards by means of wooden wedges, whilst at the same time it disengaged them from the cusps of the lower teeth by means of gold caps fitted over the second molars so as to prop the mouth open. It should be added that the removal of the first molars did not enable the front teeth to be approximated any more closely than before.

"As soon as the bicuspids had passed out, so as to bite outside the lower teeth, this plate was abandoned in favor of one with a stout gold wire passing outside the incisors, canines, and bicuspids, and being attached to the vulcanite plate in the spaces left by the extraction of the first molars.

"To this band, which had been rendered elastic by hammering, the central and lateral incisors and canines of both sides were firmly attached by silk ligatures, the band being pressed inwards towards the teeth by the finger of an assistant, while each ligature was being tied.

"The effect of this was to draw the teeth outwards rapidly, and to make the front of the arch rounded in the place of having the angular form characteristic of the V-shaped jaw, so that the upper teeth assumed a perfectly regular position amongst themselves.

"As soon as the upper teeth had been drawn outwards so that the arch was wide enough to allow of their passing outside the lower teeth, pressure was brought to bear in order to close the front part of the mouth by means of a simple arrangement of elastic bands.

"A circular air-cushion was adapted to the chin and connected by strong pieces of elastic with a cloth band passing over the top of the head; the whole was kept in place by two pairs of ribands which were tied at the back of the head. (Fig. 12.) At first some little trouble was experienced, owing to the skin of the chin becoming tender under the heavy pressure; but this was combated by the use of spirit lotions, and by putting slightly oiled lint between the air pad and the skin. This apparatus was worn constantly at night, and also during a considerable part of the day, the teeth being kept from falling back into their former positions by a light retaining plate. At the time when this apparatus was first adjusted the only teeth which came into contact were the upper and lower second molars and second bicuspids.

"For a few weeks no very marked effect was produced save slight pain in the region of the temporomaxillary articulation; but after that the gap between the upper and lower incisors diminished each week by an amount that could be

Fig. 12.

measured, and the expiration of six months from the first commencement of treatment (the elastic bandage having been worn for about four months), not only had the gap entirely closed, but the upper central incisors had been made to overlap the lower to the extent of 1/16 of an inch, while, as may be seen in the accompanying figure, the laterals and the canines also overlap and antagonize."

In the same journal June, 1873, page 245, *Alfred Alex. DeLessert,* in speaking of *The Results of Fruitless Thumb-sucking,* concluded his article by saying:

"But though fruitless sucking has undoubtedly its many attendant evils, this most natural habit must surely have its attendant benefits if not carried to the excesses I have alluded to; and I think there is little doubt but that the pressure exerted by the tongue, thumb, finger, or hand, materially assists in the development and expansion of the jaws; for it is an undoubted fact that most of the V-shaped palates and mouths with crowded teeth so often placed under

a dentist's care for regulation are found in patients suffering from enlarged tonsils, and whose respiration through the nares is almost an impossibility, so that an open mouth is necessary, and thus the dental arch is allowed to contract without any opposing force."

William Barkley, in speaking of *Pegs vs. Screws in Cases of Torsion,* page 307 of the *British Journal of Dental Science,* 1873, takes exception to *Browne-Mason's* claim "that torsion was practiced only by Sheffeld and his pupils.

"As regards the discussion as to the advantage offered by pegs over screws, and vice versa, my own experience is decidedly in favor of pegs. I have more than once seen the enamel strained by the undue pressure of screws, and if we furnish our patients with such powerful means as a screwdriver to perform their own dental regulations such a result is not to be wondered at. And I must quite disagree with the gentleman who stated pressure by pegs is not continuous; if such is ever the case it is only because they are applied in a manner ill calculated to effect the object in view. The first step towards success is to obtain a perfectly firm fit of the plate, without bands or clasps for if such are used when pressure is applied, they can hardly fail to act injuriously on the teeth they embrace. My plan, which I do not offer as being particularly novel, is to strike the plate entirely over the molars, first covering the same with sheet lead sufficiently thick to admit of platina gauze being soldered on the plate, on which gutta-percha is imbedded; the plate is then placed in boiling water, and the patient directed to bite it steadily into place; it will be found to fit so firm as to require some force to remove it, and in this condition it should be allowed to remain for a short time; in fact until the patient has become accustomed to it, the cells for the pegs are of course already soldered to the plank. In a day or two the pegs may be added, but left $\frac{1}{16}$ or $\frac{1}{8}$ of an inch too long, the plate not then touching the entire palate by a distance equal to the excess of the pegs."

S. J. Hutchinson describes *A Simple Method of Correcting Irregularities* in the above journal, page 401. "In order to test the value of such a method as is now to be described, the requirements necessary to treat a case of irregularity may be mentioned to see how far this may fulfill them.

"1. As to its efficiency in moving irregular teeth.

"2. Whether it is comfortable to wear.

"3. Is it easily made and easily adjusted?

"Lastly. As to the length of time it is kept in place, and how frequently the patient must see the dentist.

"A plate to fit the palate extending as far back as the first molar may be made of vulcanite or gold, the former preferably with a plain round gold wire, pin size, extending outside the arch of the teeth, not quite touching them, and on a level with their necks, each end embedded in the vulcanite, going either behind the last molar or even between the molars, or bicuspid and molar, or through any space caused by extraction.

"Should any of the upper teeth fall within the lower arch of course the back teeth will require capping, and to the caps the wire may be fixed. The plate will now fit in the mouth quite firmly, and the means of moving the mis-

placed teeth can be adjusted without making the plate much more uncomfortable than an ordinary artificial denture is at first.

"It is only necessary to use a small elastic ring, either an ordinary regulating ring as supplied by the depots, or what I find answer better, keeping the contractile force longer, slices of India rubber tubing, such as is used for the ether spray.

"The ring is first put around the neck of the irregular tooth then the plate is put in; the ring is now stretched forward above the gold wire, brought down over it and back again over the tooth. This can only be done when the teeth are fully erupted and well developed, for should they be very short and inclined outwards it is better to put a small stud in the plate behind the tooth to be moved to hook the ring over, though then only two strands of elastic are at work, whereas, in the first case, four strands are dragging vigorously, but steadily, at the tooth; sometimes, also, it is requisite to tie floss silk or gilling twine to the ring and then round the neck of the tooth to prevent its slipping off. Another way of fixing the ring in the palate is to drill two small holes side by side, countersink between them on the side next to the palate, and tie the ring to the silk, cutting two grooves for the elastic to lie in so as to be out of the way of the opposing teeth and less irritating to the tongue.

"The gold wire being made springy and standing off from the teeth is dragged against them by the elastic, but when their movement has commenced the wire regains its normal curve, thus lending additional outward force, and does not uncomfortably protrude the lip, but is farthest away from the side teeth.

"In conclusion, how far does this method fulfill the conditions required?

"It is certainly efficient, because the contraction of an elastic ring is a constant force very different from a piece of compressed wood, whereof the full expansibility is gained in at the most two hours.

"It is more comfortable to wear than a plate which is displaced by the motive power, for in this the position of the wire and plate is constant, the elastic working on the tooth from two fixed points."

DEPARTMENT OF
DENTAL AND ORAL RADIOGRAPHY

PRACTICAL RADIOGRAPHY FOR THE ORTHODONTIST*

By Captain Edward H. Skinner, M.R.C., Kansas City, Mo.

GENERAL CONSIDERATIONS

IT would seem that the field of radiography in orthodontics has been quite well covered by many able writers. In fact, it seems superfluous for anyone to stand before such a group of eminent specialists merely to reiterate x-ray facts familiar to all.

At one time it seemed as though the x-ray was to play a minor role in orthodontics—that the x-ray was merely to vividly portray in a tangible manner the presence or absence of certain teeth. This is simplicity itself. One has only to place a film upon one side of the suspicious area and focus an x-ray tube upon the other side toward the film.

But just as orthodontics has stepped forward and beyond the mere straightening of teeth, so we may rightfully expect that the x-ray is capable of helping much more than was at first anticipated.

We have seen the x-ray develop from the locator of bullets and the critic of fractures to a diagnostic factor in many branches of internal medicine. It even becomes a therapeutic guide in the analysis of thoracic and abdominal pathology. The x-ray has swooped down upon general operative dentistry and taken a hold that is warranted by the increased skill which it demands of the dental operator. Formerly the surgeon probed for bullets just as the dentist probed tooth canals. The surgeon failed to locate the bullet and at the same time increased the mischief of infection in his wound. Just so the dentist probed, broached, and worked blindly, only to stop in despair and close up a tooth without adequate attention to the mischief remaining sealed in and about the apices.

The modern surgeon consents to let the innocent x-ray become his probe and locator, and the modern dentist is adding the x-ray machine to his dental equipment. The orthodontist requires the x-ray for more reasons than that it is an excellent locator of hidden problems. He uses it as a critic and guide for the delicate mechanical forces he employs to correct deformities. He uses the x-ray to reassure himself of the innocent damage which his appliances inflict upon the tissues about the harnessed tooth and upon the integrity of the tooth

*Read before the Seventeenth Annual Meeting of the American Society of Orthodontists, Excelsior Springs, Mo., Sept. 7, 1917.

Since this article was written, the author has been called into service and was therefore unable to prepare the necessary illustrations.—Editor.

itself. What does it profit the orthodontist to correct a deformity if he unconsciously inflicts an apical infection of potential danger to the patient?

Recently we all have seen the mechanical prowesss of American dentistry suffer a certain amount of chagrin and lay itself liable to a charge of gross negligence and wanton disregard of the principles of surgical sepsis. It is well the orthodontists are mindful of the potential possibilities of infection about teeth which are moved from a habitat of choice to one of efficiency. We are all familiar with the psychology of freedom and efficiency. Freedom makes stalwart native strength, while efficiency requires constant supervision or the efficiency will be undermined. Just so the tooth, which is allowed to follow its own decrees of location, will be surrounded by good stout tissues; but as soon as you forcibly, even daintily, alter the location of the tooth you find it necessary to nurture the tissues about and provide ample support for maintaining the new position. We must always fertilize ground which is bearing a strange crop.

Perhaps this philosophic rambling may seem strange, but my idea is to emphasize the fact that the x-ray will serve you well as a source of information regarding the behavior of the tissues about the teeth. When one has familiarized himself with the normal appearances of the bone texture about roots of teeth, he is then able to read the textural changes upon x-ray films of areas where teeth are being shifted. For the x-ray shadows are merely records of density and show the projected histology or pathology. In the interpretation of all x-ray images it must be remembered that we obtain a projection of the textural densities upon emulsions and the analysis of these shadows depends largely upon our knowledge of histologic and pathologic tissue. For instance, caries of a crown just below the visual gum margin is recorded as an area of increased radiability or rarefaction because caries means a loss of the dense enamel which is normally opaque to the x-ray. Again, a granulation charge about the apex of a tooth root means a liquefaction or absence of lime salts now occupied by the granuloma and therefore this periapical area is rarefied, less opaque, and shows no textural lines of normal mandibular bone.

There is a wonderful opportunity for some brilliant literature upon projected mandibular densities as revealed by the x-ray. I venture to show you a set of slides which are reproductions from a monograph by Symington. These show the progressive character of the increase in densities and delineation in texture through childhood and adolescence in a most graphic manner. We must all familiarize ourselves with these shadow values of the projected bony texture upon x-ray emulsions. X-ray films must secure an analytical interpretation or they will be considered to reveal that which they do not reveal. One must not interpret a granuloma because it looks like the granuloma shadow which was seen upon another film. The varying contrast of exposed films forces the analytical interpretation of each case and always in the light of the clinical findings of the individual case.

PRACTICAL RADIOGRAPHIC TECHNIC

There are several points which may be worthy of review for this audience. They are not new. It is only because most of us get into the habit of doing things in the easiest way that we sometimes disregard a better way.

I desire therefore to briefly discuss these points:

1. Identification of films
   (a) by case
   (b) for position.
2. Methods of holding films in position.
3. Charts for exposure position.
4. Visualization of exposure position.
5. Development of films; sticks, clamps.
6. Filing of films (celluloid, glass, envelopes).
7. Viewing of films, illumination boxes, etc.

IDENTIFICATION OF FILMS

The identification of several dental films taken of the same individual is not a difficult situation. When six to ten films of the upper and lower dentures are taken, one may lay out a single set of films after development and arrange upper centrals as opposing the lower centrals. The upper centrals have broader crowns than the lowers. The lower centrals are fairly straight teeth and look like slim pegs while the upper centrals are more bullet-shaped and sometimes appear to have a circular constriction or neck at the alveolar margin. The molars are just as easily identified as there are three roots to upper molars and two roots to lower molars. Frequently the upper third and sometimes the upper second molar, have fused roots and present a conical shaped shadow.

Again, upon films of the upper molars and bicuspids we have shadows of the maxillary sinus, which absolutely identifies a film of the upper jaw. In films of the lower bicuspid area, one sees the mental foramen below the apex of a bicuspid tooth (this is frequently misinterpreted as a granuloma or apical abscess). The inferior dental canal is seen upon films of lower molars and even the inferior margin of the lower jaw is seen upon a film which is placed deeply beside the molar area. To recapitulate:

Films of the upper teeth show:

1. Maxillary sinus.
2. Molars have three roots (excepting third)..
3. Upper centrals show broad crowns and conical roots.
4. Median raphe distinctly visible.
5. No foramens or dental canals visible.

Films of the lower teeth show:

1. Molars have only two roots.
2. Mental foramen.
3. Inferior border of lower jaw.
4. No maxillary sinus shadow.
5. Lower centrals are straight and peg shaped.
6. No median raphe discernible.
7. Inferior dental canal.

Where the preceding identification is not sufficient one may make punch marks with a fine sharp point in the film before exposing. The punch mark

is placed near the edge of the film which is at the crown of the tooth and at the left lower border if it is the left upper molar area; at the lower middle part if of the upper centrals; at the lower right margin if of the upper molar, etc. The punch mark can be made with a tenaculum forceps but one of the sharp tenaculums must be broken off so that only one fine point penetrates the paper covering the film, otherwise too large a hole will be made and the film about the hole will be fogged. We have had a small tenaculum forceps fixed by adjusting a flat surface upon one of the tenaculum points.

IDENTIFICATION OF PATIENTS

Where one to ten films of several patients are made every day it becomes an exciting task to prevent confusion in the dark room. Of course, the dentist can identify the case sometimes by the fillings in certain teeth shown upon the film but the charting of the dentures is too much to ask of the roentgen technician. Someone has proposed to label the developing sticks or clips. If one is using the stick or clips manufactured by The Eastman Company, a celluloid marker with the patient's name may be placed in one of the clips and carried through to the final filing of the films.

My method is to make a dark-room list of the films as they are exposed, beginning each morning with No. 1 case and making one punch mark upon the lateral margin of all the films taken in the No. 1 case; two punch marks are made for case No. 2; three for case No. 3, etc. After the fifth or sixth case, one can draw a line across the dark room list and start over again with No. 1, because the previous cases will have been developed, dried and mounted by this time. During the day it may be necessary to use three or four sets of dark room lists. Even with making as many as four to ten films of twenty cases a day, this method has worked successfully. Naturally the films must be worked through rapidly and the day's work cleaned up each day.

HOLDING DENTAL FILMS IN PLACE FOR EXPOSURE

There are innumerable devices upon the market for adjusting and maintaining the films in position for exposure. It goes without saying that neither the roentgenologist nor a regular assistant should hold a film with his own fingers. It is too dangerous. This should be an absolute rule. After trying the many devices, one will realize that the finger or thumb of the patient is the best instrument for maintaining the film in proper apposition. It is fairly easy to have the patient hold the films for all of the upper teeth with the thumb. It seems best to hold the films to the lingual surface of the upper teeth by the patient's thumb of the opposite side (right thumb for films of upper left side and *vice versa*) and it is better to instruct the patient to hold the upper and anterior corner of the film against the hard palate rather than to attempt to hold the film against the teeth. The latter method favors the slipping of the film. However, for lower molars and bicuspids it is well to have an instrument which almost forces the film down low in the mouth so that the roots will show up satisfactorily.

There are several instruments upon the market for this purpose. The first

was introduced about ten years ago (Kny-Scheerer Co.) It has a slot for the film attached to a cork-padded bite-block and the handle is interchangeable at each end of the bite-block so that it can be used for the upper or lower right or left side. Another simpler similiar instrument has recently been placed on the market under the name of the Door Dental film holder (V. Mueller & Co.). A third instrument is the wire film holder designed by Leach, of Chicago, (Victor). This spring wire film holder is so made that the two circles of wire slip between the folds of the No. 1 or No. 2 Eastman films and permit the patient to hold the film in place by the handle. It is interchangeable for right and left sides. Another form is made for anterior teeth. The patient must hold the handle steady. It is not sufficient for the patient to bite the neck of the handle. We shall only mention for the sake of completeness (a) the elaborate set of film holders designed by Ketcham, (b) the cork bite containing the aluminum slip of Rich-Syfert, (c) the mouth balloon of Ciezniske. The aluminum envelope designed by (d) Potts of Spokane is interesting. It requires the large No. 3 Eastman film (2¼ x 3). The patient bites upon the aluminum envelope and the tube focused upon the points attached to the false film. This false film is withdrawn and the true film introduced just before the exposure is made. Stereoscopic films are easily made with this instrument by focusing stereoscopically upon the false film points and then changing films between exposures by hand, the patient's head being fixed rigidly by sandbags attached to a canvas band.

This latter instrument is especially useful in making roentgen records of orthodontic patients. Here one does not require the intimate detail about the roots of the teeth but rather to see a cross section of the teeth and the orthodontic apparatus. It is so easy for the patient to place this apparatus in the mouth and bite down upon it to maintain it in a proper position.

For the orthodontist, an extraoral method of exposure is recommended. The patient is placed upon a table with the affected jaw upon an inclined plane of 25°, with the plate between the jaw and the thick side of the inclined plane at the neck. The tube is focused from below the opposite mastoid process toward the jaw which one wishes to radiograph. This position is attributed at various places in the literature to Haenisch, Quiring and Pfahler. It is possible to obtain interpretable shadows of all the upper and lower molar, bicuspid, and cuspid teeth of one side upon the single plate. By focusing from a point just below the opposite mastoid process toward the mental foramen of the affected side one can sometimes obtain the cuspid teeth also. This method is especially recommended for orthodontics, tumors of the jaws, osteomyelitis, fractures, and impacted third molars where the patient suffers a trismus and can not have a film introduced successfully for an intraoral exposure.

A NEW METHOD FOR MOUNTING DENTAL FILMS

By W. L. Snider, M.D., Hot Springs, Ark.

DENTAL films, after developing and drying, twist and curl up out of shape so that it is difficult to do anything with them. To rectify this condition the following apparatus has been devised to quickly straighten out and leave them in a permanent flat condition.

The parts of the apparatus are shown in Fig. 1 and consist of an ordinary screw clamp that can be purchased in any hardware store and two pieces of

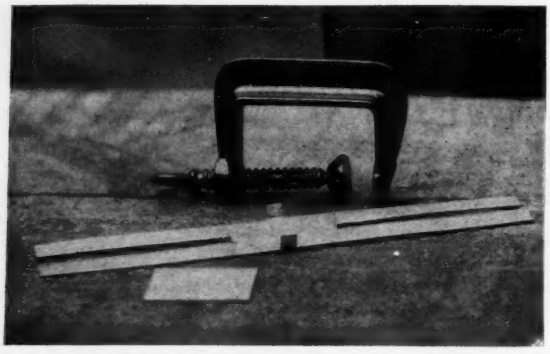

Fig. 1.

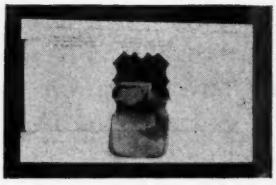

Fig. 3.

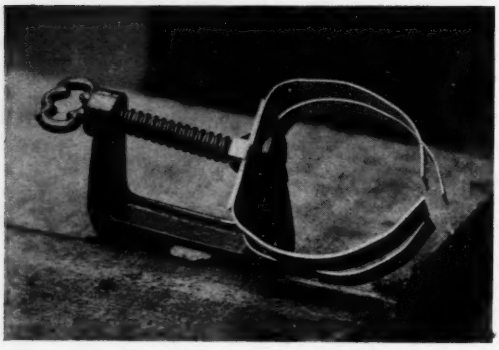

Fig. 2.

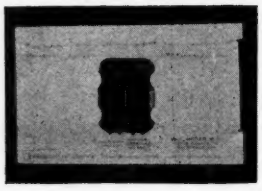

Fig. 4.

galvanized iron cut in the shapes shown in the illustration. The H-shaped piece is 8 inches long and the legs of it are about ½ inch wide. The three small uprights on the crosspiece of the *H* are about ¼ inch wide and ¼ inch high; the space between them is just large enough to hold the films to be flattened. The small rectangular piece of metal is just the size of the films.

Fig. 2 shows the different parts assembled. The legs of the H-shaped piece have been so bent that they will fit over and hold on to an ordinary electric light bulb.

In use the dried films are piled one on top of another in the space bounded by the three short uprights, the rectangular piece of metal is placed over them

(Copyright, 1918, by W. L. Snider.)

and the clamp screwed down with light pressure. The apparatus is hung on a lighted electric light bulb and left there to heat up for 10 or 15 minutes, it is then removed from the bulb and allowed to cool. When cold the clamp is removed and the films will be found perfectly flat.

I find the easiest way to put the films, when they are badly curled, in the apparatus, is to slip them one at a time with the cupped side down under my thumb; the thumb holds each one in place while putting in the next one. This slipping of one film over the other tends to scratch them, therefore, I put one of the black pieces of paper that comes wrapped up with each pair of films between each film.

The film is placed in the mount by weaving it among the projections on the sides of the hole. Start at one end of the film under the first projection, over the second (Fig. 3) and under the third; the end of the film now passes

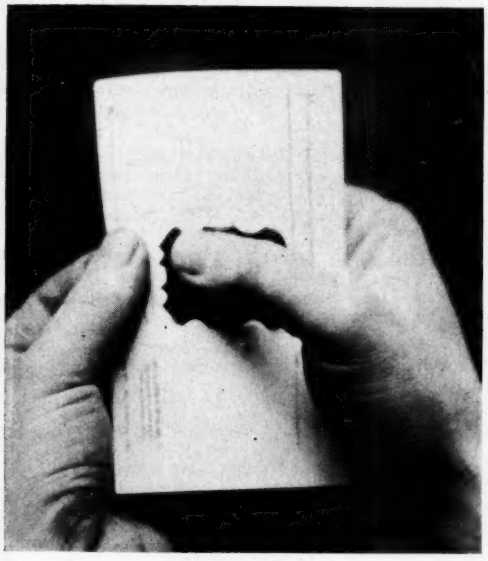

Fig. 5.

Fig. 6.

over the beveled sides (Fig. 4) and is ready to engage with the projections on the end of the hole.

The middle projection of the end of the hole goes under the film while the two lateral projections go over it. This is accomplished in the manner shown in Fig. 5. Bend the side of the mount backward with the thumb and finger of one hand and push the corner of the film slightly downward with the other thumb until the lateral projection at that corner snaps over the film. Each lateral projection of both ends is snapped over the film in this manner. The film is then mounted (Fig. 6).

This mount is cheaper than any one on the market. It can be manufactured for about one-third the cost of any other.

It can be written on with anything; pen, pencil, or typewriter. Blank space on each side of the film makes convenient place to make notations in regard to pathology shown in the film.

At a recent x-ray meeting it was agreed that the detail of a properly made film shows up better without frosted celluloid back of it.

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EDITORIALS

Missing Teeth in Orthodontic Practice

IT has long been recognized that one of the most troublesome questions in the correction of malocclusion of the teeth is found in the treatment of those cases complicated by missing teeth. Just exactly what to do with these cases and what plan of treatment is best to follow has not been satisfactorily answered for a large number of practitioners. This is proved by the interest that has been shown, whenever the question of missing teeth has been brought up for discussion and by a number of inquiries which have reached our office from various sources in the last few months.

If one will go back through the dental literature a number of years he will find that this question has been discussed in several different ways, and at the present time no satisfactory method has been suggested that can be followed in the treatment of all cases. In fact, one of the greatest troubles that seems to

arise in considering these cases of malocclusion when complicated by missing teeth, is so many practitioners want to follow a fixed rule in all cases rather than to select a treatment which is best suited to the particular case in hand. A few years ago when normal occlusion was considered before anything else, and when it was advocated that any result which did not produce normal occlusion was a failure, there remained for those men but one plan for treating cases of malocclusion complicated by missing teeth. That one plan was the placing of the teeth in normal occlusion and then restoring the missing tooth by an artificial substitute. This plan of procedure was followed for a number of years by a great many men and the difficulty encountered in some instances was in the placing of the teeth in normal occlusion, and in others the placing of the artificial substitute. As a result of this there was more or less friction between orthodontists and crown and bridge men in regard to the manner in which the missing tooth should be replaced by an artificial tooth. As a result of this controversy and as a result of a large number of unsatisfactory artificial restorations, some men began to wonder whether it was always advantageous to open up the space for missing teeth in all cases. As a result of closer study of these conditions it finally developed that there was a large number of factors which should be taken into consideration in dealing with the question of missing teeth. One of these conditions was whether the tooth was congenitally absent or whether it had been extracted. Another important factor was the age of the patient at the time of the treatment of malocclusion. Another thing to be considered was the position of the natural teeth and the necessary tooth movement involved if the space was to be restored, and lastly, after the space has been restored, came the question of the best means of restoring the missing tooth by an artificial substitute. All of these things and probably more have to be taken into consideration.

In deciding what plan of treatment is to be followed in reference to missing teeth, we must take into consideration the occlusion and esthetic results, as we find them. We must consider what the result is to be according to what plan of treatment is followed and what benefit it will be to the occlusion and facial outline. We must remember that any plan we choose will not give an ideal result, for the establishment of an ideal occlusion is impossible in cases complicated by missing teeth, whether we replace the missing tooth with an artificial substitute or follow some plan which gives a compromise occlusion, based upon the masticating efficiency of the teeth. After considering the occlusion and esthetic conditions as we find them and carefully considering the changed conditions as the result of the different plans of treatment, we are ready to consider some of the other factors which may be termed difficulties encountered in the treatment of the case. As we have said, one of the first things is the age of the patient and the condition of the surrounding tissues. It would be possible to institute extensive orthodontic treatment in a child and move teeth a great distance when the surrounding tissues were healthy, while in an adult where the tissues were not healthy we would not attempt such extensive movement. In a young person where the teeth have not been worn by mastication it might be advisable to change molar and premolar relations, mesio-distally, where the abnormal relation has been produced by missing teeth;

while in an older person where use had worn the cusps to occlude in the abnormal position mesio-distally, the best plan would be to leave the molars and premolars where they are.

The question of masticating efficiency as related to esthetics must also be considered as one thing to be recognized in treatment and should be explained to the patient. In some patients, the question of esthetics will overshadow that of masticating efficiency, which will result in one plan being followed, and in other cases masticating efficiency will have the preference in the patient's mind.

If it has been decided that the missing tooth should be replaced by an artificial one the question of prosthetic procedure becomes an important point. In considering this question, we can only do so from the orthodontist's standpoint, and may not agree with prosthetic men. We are aware that the profession will at once be divided upon the question of fixed or removal replacements. In reference to removal replacements, they must be of such a nature as to retain the normal approximal contact of all of the teeth. They must have the proper occlusion and not injure the soft tissue. In reference to fixed replacements of missing teeth, they must be attached at both the mesial and distal sides. It must be an attachment that will mutilate the abutment teeth as little as possible. This means in most cases the use of some form of inlay attachment. The attachment should be made without destroying the pulp of the tooth. The attachment should be made in such a manner as to allow of physiologic tooth movement, under the stress of mastication when possible. As a result of the difficulties encountered in replacing missing teeth, no one plan exactly fulfills all requirements.

In taking up the question of orthodontic cases complicated by missing teeth, we can also consider the cases according to the tooth that is missing, whether it is an incisor, canine, premolar or molar.

In speaking of missing incisors, the condition of the malocclusion must be taken into consideration and the age of the patient before we decide whether it would be the most advantageous thing to open up the space so that an artificial tooth could be placed. If we have a patient with the incisor missing either congenitally or the result of an accident or disease in which all of the other teeth occupy practically a normal position both approximally and occlusally, as a general rule, the only thing to do would be to use an artificial substitute. After the space has been opened and it has been decided to place an artificial substitute, the question of procedure from that point on becomes one of more or less importance. The first question is, How are you going to replace an artificial substitute? To answer this question in a general way we believe that any plan that is followed must be a plan which will support the artificial tooth on both the mesial and distal sides. In other words, no artificial tooth should be placed in an orthodontic case which is not supported by two teeth. In making this statement we recognize the fact that we are going to be criticized because in doing this it will be necessary to mutilate the two approximating teeth. In mutilating these teeth we are aware of the fact that we will be confronted by the question of whether or not we shall remove the pulp. This particular question will be answered very emphatically, both ways, depending on whether

the crown and bridge man is one who believes in "vital" attachments or one who believes in "devitalizing." We recognize the argument on both sides of the question, both from the standpoint of the crown and bridge man and from the standpoint of the orthodontist, as well as the efficiency from the standpoint of the patient; it has seemed to us that the most important thing to consider in orthodontic cases where missing incisors are being replaced is the question of esthetics and the maintaining of the occlusion of the other teeth. The question of strength and masticating efficiency becomes the third feature of consideration. In other words, orthodontic patients, who have artificial teeth in the anterior part of their mouths should be instructed that those teeth *will not stand* a large amount of mastication and must be favored. The reason for this advice is that if the case is favored and they are advised that a large amount of mastication can not be done on those teeth it makes possible an attachment which is better from an esthetic standpoint, although it possesses less strength. Working from the standpoint of esthetics in the maintaining of the occlusion of the remaining teeth, we believe the best plan of attachment is not to "devitalize" the abutment teeth but to place the missing tooth by means of inlays which can be done without endangering the pulp of the natural teeth.

In attaching artificial incisors by means of inlays, the inlays must be made small and placed in such a position as not to endanger the pulp. In a great many cases owing to the close occlusion between the upper and lower incisors some form of iridio-platinum spur, the ends of which are attached to the inlay can be used to strengthen the attachment of the artificial tooth. These inlay attachments, being necessarily made small so as to avoid the pulps of the teeth, do not offer as much strength as do the artificial teeth replaced by means of a post. However, the patient must be cautioned that an artificial tooth is inserted primarily for esthetic reasons and will not stand a large amount of mastication. They must also be told that it is more essential that they have a good appearing artificial tooth, without the possibility of causing discoloration in the attached tooth which may occur if the pulp is removed than it is to have one extremely rigid which does not look so well and which may result in discoloration and disease of the attached teeth.

It is better for the patient to have the artificial tooth reattached or recemented several times a year than it is to run the risk which may come from destroying a pulp. The one principal objection in making attachments for artificial teeth by means of inlays in the anterior portion of the mouth, is that owing to the small amount of tooth surface involved it is very difficult to make an attachment which fulfills the physiologic conditions of mastication. It is very difficult to attach the artificial tooth in such a manner that the abutting tooth can respond under the stress of mastication which is one of the physiologic factors. Even though physiologic tooth movement can not be obtained in the anterior portion of the mouth as satisfactorily as in the case of molars and premolars, we believe the inlay attachment offers better conditions than any plan which has been followed heretofore.

We have seen a number of cases which involved missing maxillary laterals in which we believed a more efficient result from the standpoint of occlusion and mastication and even probably from the standpoint of esthetics could be ob-

tained without opening up the space for the lateral. We refer to those cases which sometimes have been classified according to Angle's plan, as a subdivision of Class II which really are not distoclusion cases, but which are cases in which the maxillary molars, premolars, and canines because of loss of approximal contact, have taken a mesial position in regard to mandibular teeth. In other words, we find the mesio-buccal cusp the maxillary molar occluding between the mandibular first molar and second premolar, with the maxillary first premolar occluding between the mandibular first premolar and canine and the maxillary canine occluding in the position of the maxillary lateral. In order to open up this space for this missing lateral, it would be necessary to move distally all the molars and premolars and canine upon that side. This movement could be accomplished, but it involves a long period of orthodontic procedure which in a patient past the age of twelve would be a very questionable thing to do.

In order to establish anything like an efficient occlusion such as we have in the beginning a bodily movement of all of those teeth would be necessary which, while possible, would involve a long period of time and would result in an occlusion which from a point of masticating efficiency would be no more satisfactory than the one which we had in the beginning. We believe in a large number of those cases a much more efficient occlusion can be obtained and a dental apparatus produced which will be more serviceable to the patient by leaving the maxillary molars and premolars on the abnormal side in the mesial position and correcting whatever other malocclusions may be present. One of the reasons a better occlusion of the molars and premolars from a masticating standpoint can be obtained by leaving them alone is that the cusps have worn to fit in that position. If the patient had never masticated sufficiently to wear the teeth, this plan would not be so advisable. After the malocclusion is corrected, the maxillary canine which is in the place of the lateral can be ground down and made to resemble a lateral as nearly as possible.

We will admit that this plan does not give the most ideal esthetic result, but often gives a much more efficient occlusion and one which is going to be much more serviceable for the patient than would be obtained by the long orthodontic procedure of moving the molars, premolars, and canine distally and then forcing to place an artificial lateral. We have known of several such cases which have been treated with the idea of restoring the space for the missing lateral and they have not been satisfactory results in the end. We would especially recommend this plan of treatment, which may be termed compromise treatment, as being the one indicated in patients in whom the second molars have erupted and where the question of masticating efficiency and permanency in results are considered more important than the ideal molar relation with possible improved facial outline. We are aware of the fact, that the statement has been made that the upper arch should be expanded and the space made for the missing lateral in order that the nasal cavity and sinuses may have their proper development.

However, in answering this argument, you must remember that we have approximately the same amount of expansion of the upper arch by leaving the maxillary molars and premolars in the mesial position and occluding normally buccolingually with the mandibular molars as we would have if we moved the maxillary molars and premolars distally, which movement would in no way increase

the expansion of the maxillary arch in such a manner as to produce a development in the nasal cavity. In other words, in the style of cases which we have described the space if made for the maxillary lateral would not be obtained by an expansion of the maxillary arch but by a distal movement of the molars, premolars, and canine. Therefore, the argument for the development of the maxillary arch loses weight because a distal movement of the molars, premolars, and canine would not produce an expansion of the maxillary arch. Again, besides the difficulty encountered in the distal movement of the first and second molars, premolars, and canine, we have to consider the possible result upon the maxillary third molar which in some cases will produce no trouble, but in other cases, will be so impinged against the root of the second molar that it practically prevents a bodily distal movement of the molar teeth.

When we consider the question of replacing canines which are seldom missing except as the result of accident or disease, we again must take into consideration the conditions present in that particular case. If we had a case of malocclusion in a comparatively young patient in which all of the remaining teeth occupied a normal mesio-distal relation to the occluding teeth, as a general rule, we would say the upper canines should be replaced by an artificial substitute. This artificial substitute should be anchored to both the premolar and lateral, at least the anterior end of the mesial surface of the artificial canine should have some sort of support upon the lateral incisor. This support should be made in such a manner as to maintain normal proximal contact and prevent the lateral incisor from slipping past the artificial canine labially or lingually. We also would suggest that in these cases an inlay be placed in the lateral which would be cemented in place. A cavity or groove should be cut in the inlay for the reception of an abutment or spur from the artificial canine. This would give a support occlusally, bucally and lingually and still allow for a certain amount of movement between the artificial tooth and the canine under the stress of mastication and thereby more nearly approach physiologic conditions. From our observation, we also believe that in the replacement of a missing canine by an artificial substitute, such attachments should be made as would not destroy the pulp of either the premolar or the lateral.

We find another class of cases in which the canine has been missing congenitally and the molars and premolars, on that side have come forward until the premolar occupies the position intended for the canine with the molars and premolars one cusp mesial to normal. In such conditions as that, we believe it would be much better not to open up the space for the missing canine but to leave the occlusion as has been established during the process of development and allow the first premolar to occupy the position of the canine, with all the molars and premolars on that side one cusp mesially. Such conditions as this will give just as good an esthetic result as would be obtained if the canine were in position, for the first premolar has probably erupted in an upright manner and in its forward position the crown and root consequently fills out the corner of the face the same as a normal canine would. The occlusion of the mesial molars and premolars have probably worn in such a manner as to make an efficient occlusion which would be just as good from a masticating standpoint as if they occupied their normal positions.

Another condition, which we sometimes find in missing canines is that in which there is a normal mesio-distal relation of the molars and premolars with the first premolar in the arch from which the canine is missing, in proximal contact with the lateral. In the arch, which contains the full number of teeth we find the premolar region very badly bunched with one of the premolars in linguoversion and the other in buccoversion with probably decided torsiversion of the canine and lateral. In these cases, after the eruption of the second molar, we find the orthodontic treatment would be decidedly shortened by the extraction of one of the premolars from the arch which contains the full number of teeth. In some instances, the extraction of the canine might be advisable provided it was in the lower arch, but in such cases as we have observed, the best masticating results have been possible by the extraction of a premolar. This leaves the same number of teeth in both arches and makes possible an efficient occlusion with the least possible movement of the remaining teeth which from a masticating standpoint is very efficient.

We also find the esthetics of those cases are very good and in patients after the eruption of the second molars past eighteen or nineteen years of age we believe such a compromise treatment is the best thing advisable.

The question of missing premolars, upper or lower, is very much the same and has to be considered in regard to the age of the patient, the extent of the development of the alveolar process or growth of the jaws, and whether the tooth is congenitally absent or has been lost as a result of accident or disease, and the position of the remaining teeth from an occlusal standpoint. In dealing with premolars that are congenitally absent, we have found in our practice the ones most often missing are the mandibular second premolars. Because of this, we believe it is a good plan in the treatment of every case of malocclusion before the time of the eruption of the premolars to have radiograms made to prove whether the premolar is missing or present. Therefore in treating a case of malocclusion in which we find the mandibular second premolar is absent, we believe a more efficient result from the standpoint of serviceable occlusion can be obtained by instituting a plan of treatment, which will move the mandibular molars forward to the width of the premolar, therefore establishing a mesial occlusion of the mandibular molars with the maxillary molars and closing the space in that manner. Cases treated by this plan prior to the eruption of the second molars have shown that the first molars can be moved forward bodily and the second molars in erupting will take the position approximating the first molar. This plan of treatment produces the normal occlusion of the teeth from the first premolar forward and the mandibular molar one cusp mesial. The masticating efficiency, in these cases, is far superior to those in which a missing tooth is supplied and one which eliminates the possibility of trouble by making attachments to vital teeth.

The congenital absence of maxillary premolars before the eruption of the second molar should be handled in the same manner, which would consist in the mesial movement of the maxillary molars to close the space of the missing tooth. In cases of advanced age, after the eruption of the second molars, where premolars have been lost as a result of accident or disease, the treatment in those cases would depend upon the condition of the remaining teeth. If the space

of the missing premolar has been closed by a mesial drifting of the tooth distal to the space, in the majority of cases, it is the most advisable plan to straighten up those teeth and restore their use by an artificial substitute. In cases of patients of advanced age, who because of extraction have lost the masticating efficiency, it is not always desirable to attempt a mesial movement of the molars to close up the space made vacant by the premolars. In these cases, which are the result of mutilation, something must be done to improve the masticating apparatus of the patient. We must decide what is going to give the most serviceable results with the least possible sacrifice to the patient and if that plan is followed, which involves the opening up of the spaces, we then have to use artificial substitutes the same as we would in any other class of case where artificial substitutes are required to improve the function of the teeth. Again, in the replacement of the premolars the same plan must be followed, the replaced tooth must be attached at both ends. Secondly, we believe the best results can be obtained by means of inlay attachments which may be described as one inlay within another or by some form of removable attachment which allows for individual movement of the teeth during mastication.

As a general plan, we would condemn the "devitalization" of both teeth or any plan of attachment which has for its object the production of extreme rigidity which would not allow individual movement between the abutments under the stress of mastication. We would also as a general rule condemn the use of shell crowns as a means of attachment not only because of the rigidity but also because of the great tendency for gingival irritation where shell crowns are used. Another type of case which we have to consider is that in which the premolar has been congenitally absent or has been lost early in the life of the patient. In those cases in which the maxillary and mandibular molars occupy a normal mesio-distal position to each other and the teeth in the arch from which the premolar is missing have approximal contact, the arch is in fairly good shape. The arch which contains the full number of premolars is badly contracted with probably one of the premolars in linguoversion and the other in buccoversion and possibly some torsiversion of the anterior teeth. We also find some of these patients in which the second molars have erupted and the patient is past the age of greatest development.

Therefore, we believe in the majority that a much more serviceable result can be obtained by the extraction of one premolar from the arch which contains the full number to correspond with the missing premolar of the opposite arch. This will then make possible the alignment of the remaining teeth and consequently produce a very good harmony in the size of the arch and a very serviceable occlusion. This result can be obtained in much less time than to open up the space for the artificial tooth and eliminates the necessity of putting in an artificial substitute, as a result of which we believe a better service has been rendered the patient by harmonizing the two arches and producing a serviceable compromise occlusion than would have been obtained by opening up the space and putting in an artificial tooth.

You will therefore notice in dealing with the question of missing premolars, we have advocated three different plans of treatment, all of which are based on conditions outlined in the beginning; namely, the age of the patient, the position

of the remaining teeth and the stage and development of the alveolar process. Each one of these plans have been different and each one gives the most satisfactory results in the particular case outlined.

When we come to the consideration of missing molars we again must be controlled by the age of the patient and the condition of the malocclusion as we find it. We believe in young individuals, in children before the eruption of the second molar where the first molar has been hopelessly diseased and has to be sacrificed, the best plan of treatment is to move the second molar forward during the process of its eruption and make it occupy the space formerly occupied by the first molar. Various cases treated by this plan show that by proper orthodontic procedure maxillary and mandibular second molars can be made to assume the position of the first molars, in an upright manner and so produce a very serviceable occlusion. This plan of treatment also avoids the necessity of wearing a mechanical retaining device to keep the space made vacant by the missing first molar. We even find another class of cases, after the eruption of the second molar and before the eruption of the third, in which we believe it is advisable to bring the second molar forward and close the space made vacant by the first molar. We refer to those cases in which the radiogram reveals the first molar to be in such a hopelessly diseased condition that the question of its loss will only be that of a few years. We believe in such cases it is better to extract the first molar in a patient twelve, thirteen, or fourteen years of age and bring the second molar forward bodily to close up the space made by the loss of the first molar. Upon eruption the third molar will take its position behind the second molar and will generally be a very serviceable tooth. We have observed in these cases where the first molars are lost early, the third molar has always possessed a well-developed crown and become a very serviceable tooth which is probably caused by relieving the pressure and bringing the second molar forward and giving the third molar ample room to develop.

In mutilated cases in adults in which there has been a loss of first molars by extraction and the space has been closed by the drifting of the other teeth, we can only say that each one of those cases will have to be decided upon the conditions present. We very often find the second molar has tipped forward and in straightening up the second molar after it has assumed a normal occlusal plane, we still find that the tooth occupies a position mesial the width of one cusp. In these cases, we do not believe that the best plan of treatment is to move the second molar distally to a normal position, but a more serviceable condition can be obtained with a shorter orthodontic treatment by leaving the tooth fitting mesial in the normal occlusal plane than by attempting to move it distally to its normal position. In opening up the space for missing mandibular first molars, it is always necessary to move the teeth anterior to the space, the canine, premolars and incisors, into the normal position mesio-distally. As a result of this treatment, we only open up space sufficient for a premolar, but all of the teeth anterior to that space occupy normal mesio-distal relation and the mandibular molars, second and third, are set into an upright occlusal position even though one cusp mesial. In opening up spaces for missing maxillary first molars the same plan can be followed in that the posterior molars must

be placed in an upright occlusal position, but it is not absolutely necessary that they be moved distally to their normal positions, for in adult patients this movement will very often result in an absorption of the process as a result of the extreme distance which they are removed. After the second and third molars have been straightened up in a normal occlusal plane and occupy normal bucco-lingual relation, we do not believe that an ideal or normal mesio-distal position very greatly improves the masticating efficiency of those teeth.

In replacing missing molars, the manner of attachment will depend more or less upon other conditions present. However, if the second molar or second premolar is vital, we would prefer some form of attachment which allows them to remain vital. In other words, we would object to the "devitalization" of healthy teeth for the purpose of making an attachment to carry an artificial substitute. It is needless to say that all replaced molars should be attached at both ends in such a manner as to retain the bucco-lingual relation of the approximating teeth. The attachment should be made in such a manner as to allow physiologic movement of the attached teeth.

Again, we would caution all in considering the question of missing teeth in orthodontic practice to remember that no one plan can be followed and that each case must be decided upon its merits which will take into consideration the age of the patient, the condition of the remaining teeth, the degree of development of the alveolar process, and lastly the occlusal efficiency of the plan that is decided upon. Each case must be decided upon its own conditions and a plan that would be advantageous for one patient would not be the best plan for another.

Announcement of the Meeting of the National Dental Association

THE National Dental Association will hold its Twenty-second Annual Meeting in Chicago, August 5-9, 1918. The headquarters will be at the Auditorium and Congress Hotels situated on Michigan Avenue, corner of Congress street. All meetings, clinics and exhibits will be held in these two hotels, which are connected with an underground tunnel.

The important announcement at this time must be the warning *"Reserve your rooms at once. Make reservations by mail direct to the hotel of your choice. Arrangements for parking cars should be made direct to the garage."*

The following is a list of hotels and rates:

AUDITORIUM HOTEL, MICHIGAN BOULEVARD AND CONGRESS STREET

Single room without bath, $1.50 and $2.00 per day.

Single room with bath, $2.50 to $4.00 per day.

Double room without bath, $2.50 and $3.00 per day.

Double room with bath, $4.00, $5.00 and $6.00 per day.

CONGRESS HOTEL AND ANNEX, MICHIGAN AVENUE AND CONGRESS STREET

Room, detached bath (one person), $2.00, $2.50, $3.00 per day.

Room, private bath (one person), $3.00, $3.50, $4.00, $5.00 $6.00 per day.

Room, detached bath (two persons), $3.00, $4.00, $5.00 per day.

Room, private bath (two persons), $5.00, $6.00, $7.00 per day.

Suites: Two connecting rooms, private bath (two persons), $6.00 to $10.00 per day.

Three or four persons, $8.00 to $14.00 per day.

Corner Suites: Parlor, bedroom, and private bath, $10.00 to $50.00 per day.

THE FOLLOWING IS A LIST OF GARAGES AND RATES:

Our rates for storage are $1.00 for the first 24 hours, and 75 cents each additional 24 hours. At these rates cars can be taken out for driving and reparked during the same 24 hour period at same charge.

CITY AUTO PARKING COMPANY,
A. V. Jackson, Gen., Mgr.,

Michigan Ave, and Lake Street,
Chicago, Ill.

We are prepared to take care of thirty or forty cars during your convention, at a special rate of 75 cents per day, provided they notify us of their identity as a member of your Association.

DOWN TOWN GARAGE,
A. J. Bemmer, Mgr.,

Michigan Blvd. and Eighth St.

One thousand cars can be parked in Grant Park (on the Lake Front) free. The City of Chicago furnishes policemen to watch these cars.

—J. P. Buckley,
Chairman Publicity Committee.

GENERAL CLINIC

Arrangements are sufficiently advanced to promise the members of the Association that the General Clinic will be one of the great features of the 1918 meeting.

In conference with officers of the National Dental Association, the Committee in charge of the General Clinic carefully considered the nature of the clinic to be presented this year. After trying for the past few years new features in conducting the Clinic Program, it is the belief that a greater number will be served and benefited by holding a General Clinic, grouped into Sections:—namely—Operative, Prosthetic, Crown and Bridge Work, Orthodontia and Prophylaxis.

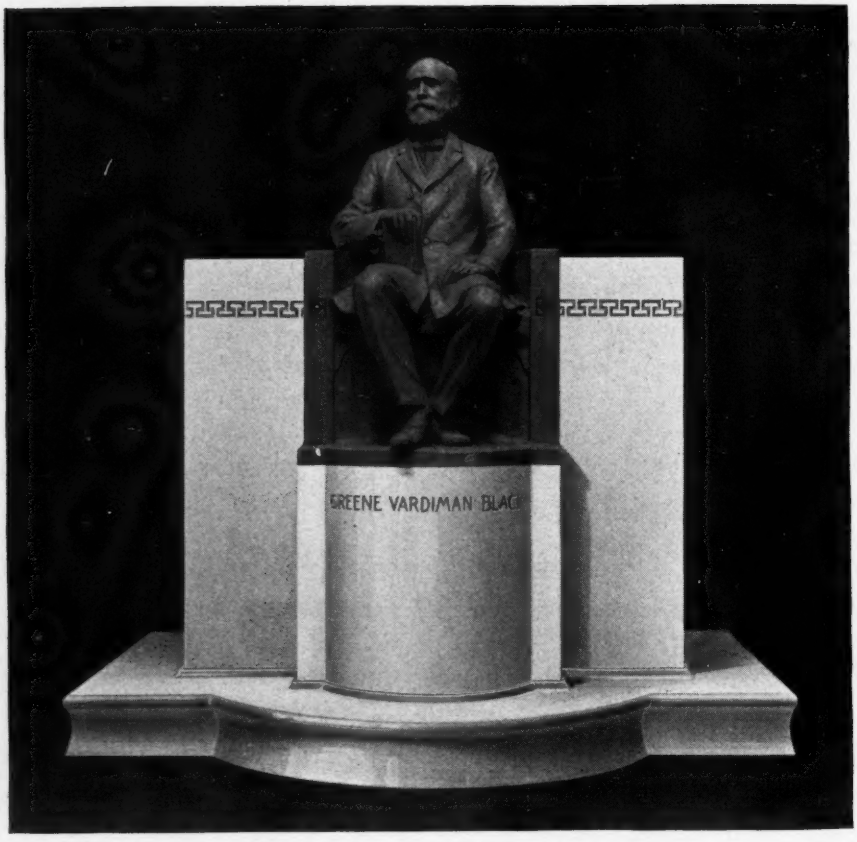
To make it national in character, the president, of the different state societies, was requested to appoint two Clinicians and two associates from his state society.

Up to date, thirty-nine state societies are represented and the remaining nine will be represented before the publishing of the official program.

Far away Alaska is sending two and two associates, and to make the clinic more than national, in fact an allied affair, the Canadian Dental Association has promised ten of the best clinicians in the Dominion. In addition, there will be a few unit clinicians who will demonstrate principles that require more than two men.

It is safe to say that this clinic will be unique in the sense that every man on the program will either be present or be represented by his associate.

—Don M. Gallie, Chairman, General Clinic.



GREENE VARDIMAN BLACK MEMORIAL.

A Memorial from The National Dental Association. To be Dedicated at the 60th Anniversary Meeting to be held in Chicago, August 5-9, 1918.